SEP [illegible] 1947

ENGINEERING NEWS-RECORD

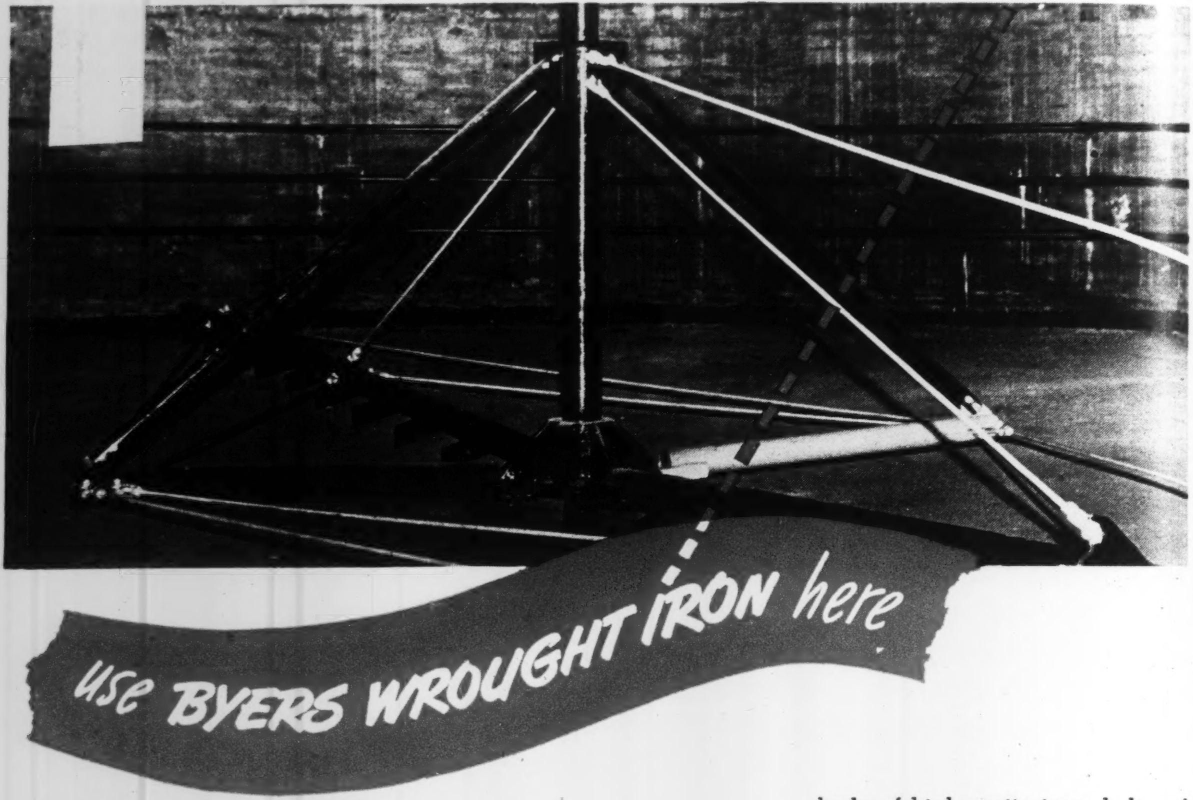
A McGRAW-HILL PUBLICATION

SEPTEMBER 4, 1947

Waterworks Showplace in South Africa—Capetown's Steenbras Filtration Plant

eaturing—CONCRETING TECHNIQUES FOR ELEVATOR CONSTRUCTION
COORDINATING STEEL ERECTION FOR TERRACE PLAZA HOTEL

o avoid "Digestive Troubles" in ew sewage treatment plants,



Sewage treatment plants are filled with corrosive services, but if you were going to pick the toughest one, it would probably be the sludge digestion tank. Here the normal aggressiveness of the sewage is increased by elevated temperatures, so that the heating coils face unusually severe conditions. The stirring mechanism has almost as great corrosive attack to contend with, and in addition is subjected to mechanical stresses and strains while operating.

Fortunately, you don't have to look far for an answer to the material problem. Byers Wrought Iron has given a splendid account of itself in heating coil applications, and some of the largest and most modern plants in the country use the material exclusively for this service. New York, Indiana, Massachusetts, Pennsylvania, Illinois, Texas and Rhode Island all have plants built within the past few years in which Byers Wrought Iron was selected for digestion tank heating coils by the engineers.

The service of wrought iron in heating coils would be enough to indicate its value for stirring mechanisms, but there is direct evidence available. One western municipality installed a mechanism made of ordinary materials when the plant was built. It failed in only one year. A new one, fabricated from Byers Wrought Iron bars, plates and angles was then installed. That was six years ago, and it is still serving, with no repairs or trouble.

Wrought iron's dependability stems directly from an unusual structure. Tiny fibers of glass-like silicate slag, threaded through a body of high-purity iron, halt and diffuse corrosive attack. They also anchor the initial protective film, which shields the underlying metal.

You will find some detailed information on wrought iron in sewage services in our bulletin, "Wrought Iron for sewage treatment and disposal installations," which will help you in planning any modernization or new construction. May we send you a copy?

A. M. Byers Co., Pittsburgh, Pa. Established 1864. Boston, New York, Philadelphia, Washington, Atlanta, Chicago, St. Louis, Houston, Salt Lake City, Seattle, San Francisco. Export Division: New York, N. Y.

CORROSION COSTS YOU MORE THAN WROUGHT IRON

BYERS
GENUINE WROUGHT IRON
TUBULAR AND HOT ROLLED PRODUCTS
ELECTRIC FURNACE QUALITY ALLOY AND STAINLESS STEEL PRODUCTS

ENGINEERING NEWS-RECORD

Devoted to Buildings, Sewerage, Waterworks, Bridges, Roads, Dams, Foundations, Earthwork, Flood Control, Public Works, Airports, Irrigation, Canals, Tunnels, Railroads

Volume 139 • **Number 10**

September 4, 1947

ALBERT E. PAXTON......*Publisher*
WALDO G. BOWMAN........*Editor*
EDWARD J. CLEARY *Executive Editor*

•

ASSOCIATE EDITORS—V. T. Boughton, R. K. Tomlin, H. W. Hunt *(New York)*, V. B. Smith *(Chicago)*, J. R. Carr *(Cleveland)*, N. A. Bowers *(San Francisco)*, A. N. Carter *(Washington)*

ASSISTANT EDITORS—F. S. Merritt, John C. Bumstead *(New York)*; L. L. Wise *(San Francisco)*

NEWS EDITORS—E. E. Halmos, Jr. and T. D. MacGregor

STAFF ASSISTANTS—Ethel Lyon, Helen McCord, Louise Jacobson

BUSINESS NEWS—Elsie Eaves, *manager*, J. A. Mahoney, E. R. Biggerstaff, Marie W. Roessler

ENGINEERING NEWS-RECORD
Published by
McGRAW-HILL PUBLISHING CO., INC.
Publication Office:
99-129 N. Broadway, Albany 1, N. Y.
Editorial and Executive Office:
330 W. 42nd St., New York 18, N. Y.

FEATURES IN THIS ISSUE

News of the Week 69
Editorials 78
Waterworks Showplace in South Africa 80
Piles Carry 60 Tons to Chicago Hardpan .... H. CAUDILL 83
Expanding Pipe to Make it Rounder and Stronger 86
Improved Techniques in Grain Elevator Construction 88
Cleaning and Lining Cast-Iron Pipe 93
Concrete-Filled Steel Piles Support Wharf .... R. R. SHOEMAKER 96
Divers Dam Chicago Water Tunnel 100
Steel Erection for the Terrace Plaza Hotel 104
Water-Sewerage Needs Are Analyzed 108
Simplified Pumping for Sewage Disposal Plant .... W. J. WENZEL 109
Sludge Depth Indicator .... J. H. BLODGETT 110

DEPARTMENTS

Construction Trends 65
Comment and Discussion 111
Unit Prices 114
New Aids 119
Men and Jobs 124
Elections and Activities 128
Manufacturers' Activities 136
Manufacturers' Publications 150
Construction Reports 185

Number of Copies of this issue printed 43,483

INDEX FOR VOLUME 138

An index for Volume 138 (January-June 1947) was published during the latter part of July. Copies are being mailed to subscribers who ordered an index for Volumes 136 and 137. Subscribers who did not order a copy of that index or who have changed their address should return this coupon to

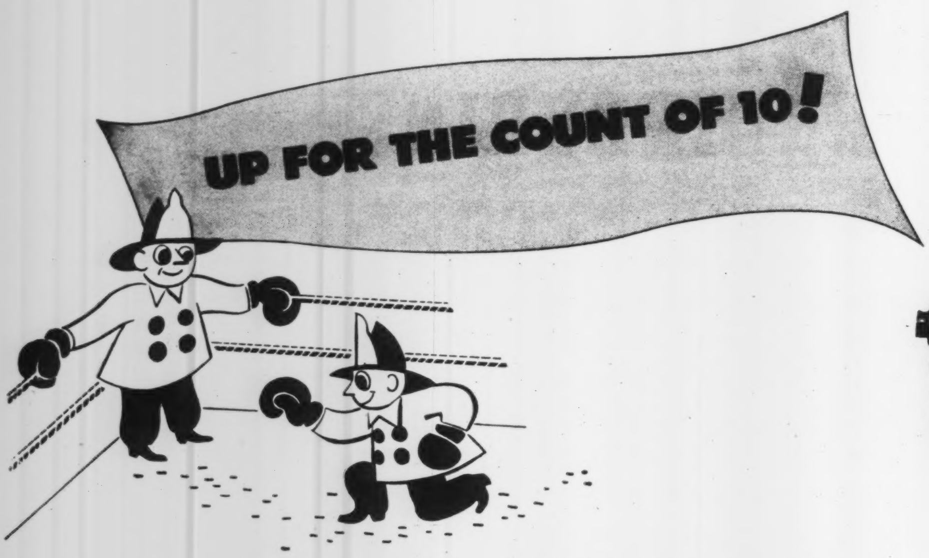
The Editor, Engineering News-Record
330 West 42nd St., New York 18, N. Y.

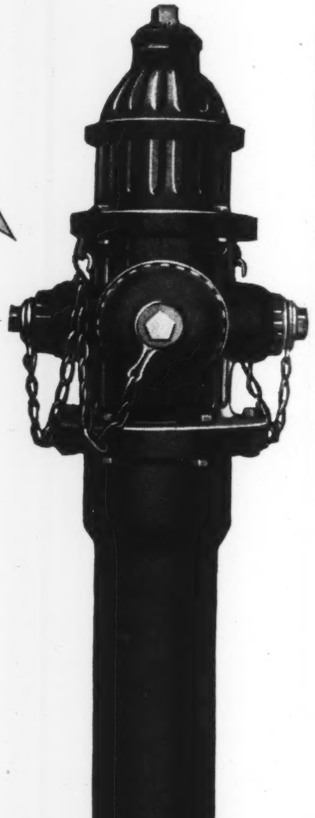
Name..

Street..

City and State..

ENGINEERING NEWS-RECORD. Published every Thursday. **Return postage guaranteed.** Vol. 139, No. 10. Price 35c per copy. Allow at least ten days for change of address. All communications about subscriptions should be addressed to the Director of Circulation, 99-129 N. Broadway, Albany 1, N. Y., or 330 W. 42nd Street, New York 18, N. Y. Subscriptions, United States and U. S. Possessions, $6.00 for one year, $9.00 for two years, $12.00 for three years. Canada $7.00 for one year, $11.00 for two years, $14.00 for three years. Latin American countries $10.00 for one year, $16.00 for two years, $20.00 for three years. All other countries, $20.00 for one year, $30.00 for two years, $40.00 for three years. Please indicate position and company connection on all subscription orders. Entered as second-class matter October 29, 1936, at the Post Office at Albany, N. Y., under the Act of March 3, 1879. Printed in the U.S.A. Cable Address: "McGraw Hill New York." Member A.B.P. Member A.B.C. Copyright 1947 by McGraw-Hill Publishing Company, Inc. All rights reserved. James H. McGraw, Founder and Honorary Chairman; JAMES H. McGRAW, JR., President; CURTIS W. McGRAW, Senior Vice-President and Treasurer; JOSEPH A. GERARDI, Secretary; NELSON BOND, Director of Advertising; EUGENE DUFFIELD, Editorial Assistant to the President; and J. E. BLACKBURN, JR., Director of Circulation. **Publication office: 99-129 North Broadway, Albany 1, N. Y. Editorial and Executive Office, 330 West 42nd St., New York 18.** District Managers and Branch Offices: Fred G. Hudson and L. H. Hunt, 520 N. Michigan Ave., Chicago 11; 738-39 Oliver Building, Pittsburgh; J. W. Otterson, 68 Post St., San Francisco 4; Aldwych House, London, W. C. 2, England; Washington; J. M. Spackman, New York. A. B. Cozzens, Philadelphia; E. E. Duff, Jr., Cleveland; B. F. Horn, Detroit; W. E. Donnell, St. Louis; R. N. Phelan, Los Angeles; W. G. Payne, Boston; Ralph Maultsby, Atlanta, Ga.

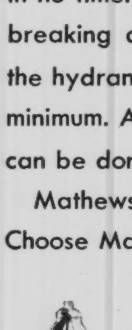

UP FOR THE COUNT OF 10!



There's just one way a Mathews Hydrant is like an ordinary hydrant—it can be knocked out in a traffic mishap. But the makers have a quick and perfect answer to that problem—a removable barrel containing all the working parts.

This barrel is to a Mathews what a spare tire is to a car. Two men with a lug wrench can unscrew the barrel and insert another in no time. An above-ground job, it does away with pavement-breaking and excavating. Usually before its service is missed, the hydrant is back on duty—cost and precious time held to the minimum. And, thanks to this exclusive Mathews feature, repairs can be done in the shop.

Mathews Hydrants are known and preferred the world over. Choose Mathews for your community and you'll be rendering a public service of the highest order.



OTHER FEATURES OF MATHEWS LEADERSHIP

Head can be rotated a full circle, on swivel flange • Replaceable head permits change in nozzle outlets • Nozzle levels can be raised or lowered without excavating • Barrel screws into bronze bushing in elbow • Operating thread (easily accessible) is only part that needs oiling. • A modern barrel makes even the oldest Mathews good as new.

MATHEWS HYDRANTS

Made by **R. D. WOOD COMPANY**

PUBLIC LEDGER BUILDING, INDEPENDENCE SQUARE, PHILADELPHIA 5, PA.

MANUFACTURERS OF "SAND-SPUN" PIPE (CENTRIFUGALLY CAST IN SAND MOLDS) AND R. D. WOOD GATE VALVES

News of the Week

ENGINEERING NEWS-RECORD • SEPTEMBER 4, 1947 • VOLUME 139 • NUMBER 10

Commerce Department finds large construction increase

Every state puts more construction in place in second quarter of year than in first—California in the lead with $414,000,000

A growing pace of construction activity in the United States is clearly indicated by a report just released by the Department of Commerce giving the results of studies covering the first two quarters of this year. The months of April, May and June show a gain of about 17 percent over January, February and March in construction put in place. Although much of this gain is seasonal, Department of Commerce experts believe that it also represents a real advance in construction activity which is likely to continue notwithstanding higher costs.

Breakdown by states

A breakdown by states of estimated new construction activity during the first and second quarters of 1947 is presented in this August construction and construction materials industry report of the Department of Commerce.

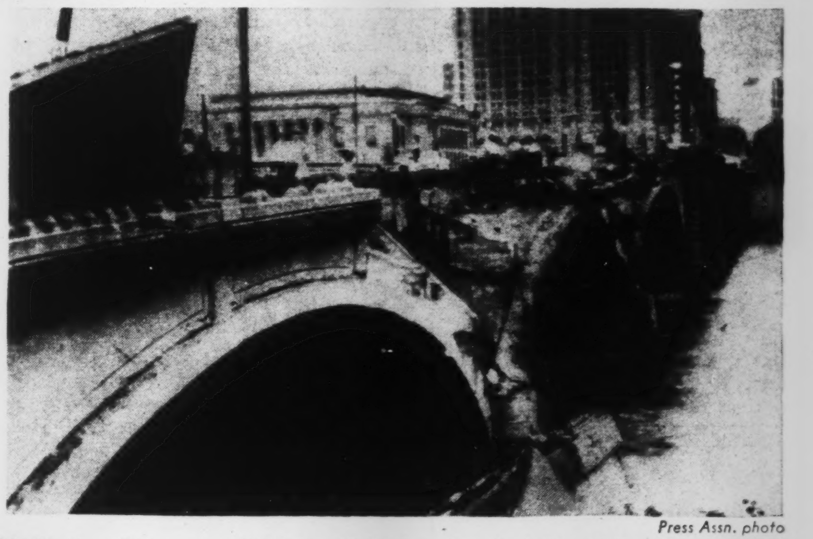
The first of a series of three tabulations prepared by the Construction Division, Office of Domestic Commerce, gives a breakdown of total new construction for each quarter. For the first quarter new construction put in place totalled $2,460,000,000 and for the second quarter $2,888,000,000. Privately financed construction amounted to $1,948,000,000 in the first quarter and $2,181,000,000 in the second quarter.

California led all states with a total of $384,000,000 in the first quarter and $414,000,000 in the second quarter. New York was second with a total of $187,000,000 in the first quarter and $202,000,000 in the second. Third in volume was Texas with a total of $176,000,000 in the first and $218,000,000 in the second quarter. Every state showed substantial gains.

In the breakdown by states of private construction, covering residential, non-residential, farm and public-utility building, the first quarter residential building is estimated at $869,000,000 and for the second quarter at $1,030,000,000, with California out front and Texas second.

Private non-residential construction for the first quarter is estimated at $782,000,000 and for the second quarter at $733,000,000, with California again leading in both quarters. New York occupied second place in the first quarter and was replaced by Texas in the second quarter. Iowa led the states in farm construction in both quarters and California was ahead in privately financed public utility construction in both quarters.

The report gives a listing of new public construction of non-residential buildings, highway construction, sewer and water construction, and all other public construction. New York led in public non-residential building in both quarters and also in all other public construction. Texas was out front in highway construction in both quarters and California in sanitary work.



Press Assn. photo

Lightning Damages Bridge—*Lightning knocked the sidewalk, spandrel wall and balustrade from one whole arch and parts of two others on the Broad Street bridge at Columbus, Ohio, on Aug. 21. The brick pavement on the south half of the roadway also was torn up and scattered over the north half of the deck. Four pedestrians were thrown into the shallow waters of the Scioto River, and one was fatally injured.*

The bridge is of re-inforced concrete, completed in 1921. The spandrels were filled below the roadway but not below the sidewalks, as will be seen in the above picture, the damage has the appearance of having been produced by an explosion. County Engineer Allan Slade has advanced the theory that the lightning may have heated the air in the almost air-tight cells below the walks, causing it to expand with disruptive force. Conversion of moisture in the cells into steam also has been suggested as a cause.

NEWS IN BRIEF

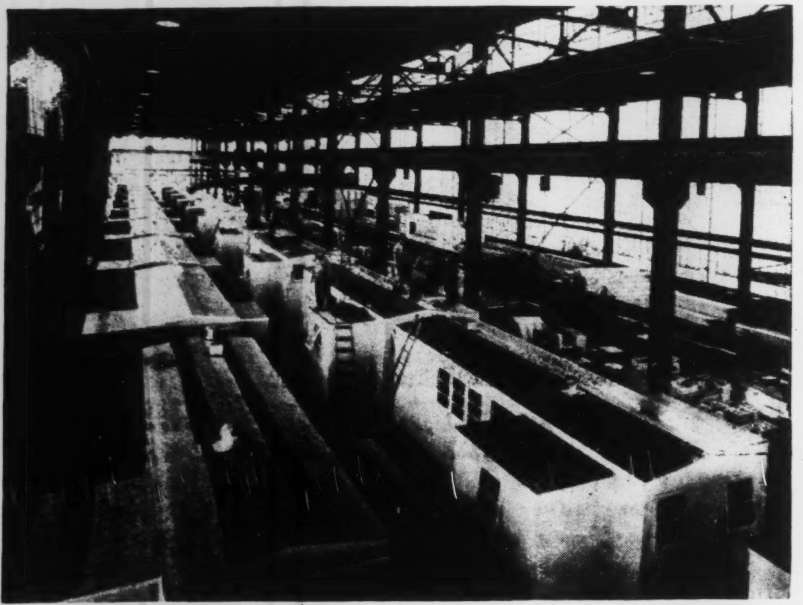
In telegraphic form, here are latest news developments on the engineering and construction front during the week.

Construction—Work has begun on a 250-bed $5,645,700 veterans' hospital in *Fresno, Calif.*, by James I. Barnes Construction Co., Santa Monica, Calif. . . . Jones & Laughlin Supply Co., Tulsa, Okla., will start construction next spring on an $8,500,000 oil refinery for Continental Oil Co. at *Billings, Mont.* . . . A contract has been awarded by Anheuser-Busch, Inc., to George A. Fuller Co. for erection at *Newark, N. J.*, of a $20,000,000 brewing plant, which was designed by Harley, Ellington & Day, architects and engineers, Detroit, Mich. . . . First step in building the Alfred E. Smith Memorial at St. Vincent's Hospital in *New York, N. Y.*, plans for which were prepared by Eggers & Higgins, architects, will cost $4,700,000 and includes a new 10-story building, modernization of the main building, and a 2-story section under the present courtyard. . . . John Wanamaker of Philadelphia will erect a $1,000,000 department store in a *Wilmington, Del.*, residential section, if the zoning law can be changed. . . . A 500-mile $22,000,000 pipe line will be built by Shell Pipe Line Corp. and Texas Pipe Line Co. from *Cushing, Okla.*, to *Wood River* and *Salem, Ill.*, to carry about 150,000 bbl. of oil per day. . . . Equitable Life Assurance Society of the United States will construct a plant providing 250,000-sq. ft. of floor space for lease to Westinghouse Electric Corp. to house manufacturing and repair activities in *Chicago, Ill.* . . . Koppers Company, Inc., Engineering and Construction Division, has a $6,000,000 contract for a project to be built for Crucible Steel Company of America at *Midland, Pa.*, to include 63 coke ovens, coal handling equipment, by-product facilities and a gas holder. . . . Six buildings are included in the $4,500,000 chlorine plant at *Freeport, Texas*, for Dow Chemical Co. The contract was let to Tellepsen Construction Co., Houston, Tex. . . . Ground will be broken Sept. 8 for a $750,000 addition to St. Jerome's Hospital at *Batavia, N. Y.* . . . Construction is under way at *Winnie, Tex.*, on a $3,000,000 plant for the McCarthy Chemical Co. which will make plastics from natural gas. . . . A 11-story $4,000,000 steel-frame building with ceramic-tile exterior will be built for Pacific Telephone & Telegraph Co. in *Portland, Ore.* . . . Plans have been announced for a $10,000,000 civic center at *Montreal, Canada*, to include two small theater halls, two exhibition halls and an air conditioned auditorium seating 20,000.

Highways—In July road improvements of $4,000,000 were placed under contract in *Illinois* . . . Since spring of 1946 *Michigan* has let contracts for $41,000,000 on the state trunk line system . . . Bridge and road construction in *Franklin County, Mass.*, for 1947–48 will cost $1,326,000 . . . *Indiana* State Highway Commission is studying the possibility of constructing high speed superhighway toll roads to connect with similar roads in Illinois and Ohio. . . . Southern Pacific Railroad has begun removal of its tracks from the right-of-way for the $10,000,000 Central Boulevard in *Dallas, Tex.* . . . State highway department of Pennsylvania has retained Gannett Fleming Corddry & Carpenter, Inc., to design a bridge over the West Branch of the Susquehanna River at *Williamsport* to cost $2,500,000. . . . *Nebraska* will receive bids Sept. 11 on $930,000 worth of road improvements.

Housing—Hoosier Mortgage Service is financing construction of 363 new homes in *Marion County, Ind.*, and also of Pickwick Village in Indianapolis . . . Building contractors report 2,509 family units now being built or planned in Indianapolis . . . M. Shapiro & Son, New York, has bought 20 acres near *Louisville, Ky.*, and has plans to complete 244 apartment units within 9 months . . . Carl M. Brown, builder, announces start on the $3,000,000 Casa Linda Park 280-unit apartment development at *Dallas, Tex.* . . . A 20-unit veterans' housing project in *Fort Wayne, Ind.*, has been approved by the FHA . . . Zoning has been approved for a $2,000,000 apartment project at *Kansas City, Mo.*, to contain 172 family units.

Sewers and Water Supply—*Johnson City, N. Y.*, is having a study made for the possible revamping of its entire sewer system . . . City Manager C. Leland Wood of *Watertown, N. Y.*, believes that the city should expand its water facilities . . . The long-delayed water development and sewer expansion programs of *Phoenix, Ariz.*, got under way early in August, when construction was started on a $1,150,000 water treatment plant and a $95,000 expansion of the sewage disposal plant. The two projects are single units of a $6,000,000 water program and a $2,500,000 sewer project . . . The city council of *Los Angeles, Calif.*, has approved the construction of sanitary sewers to cost $440,442 for North Hollywood, listed as "an essential health measure."



***Prefab Production Line**—End of quarter-mile long production line in the Wingfoot Homes, Inc., plant in Washington Park, Ill., which is geared to turn out 24 to 30 completely finished houses a day on a three-shift basis. About 26 ft. long and 15 ft. wide at the wings, the houses are priced at $2,650 at the factory and by actual experience can be erected in four hours, according to the manufacturer.*

High earth fill dam ordered for Ft. Randall

Chief of Engineers says low concrete structure would cause serious loss of benefits

Saying that a high earth dam across the Missouri River at Fort Randall, S. D., is necessary to the objectives of the comprehensive plan for the development of the Missouri River Basin, while a low concrete dam at that point would result in serious losses of benefits, Lieut. Gen. R. A. Wheeler, Chief of Engineers, Aug. 29 directed that construction proceed on the high earth structure as originally planned by the Corps of Engineers.

General Wheeler's order concludes an engineering restudy of the comparative costs and benefits of a proposal to substitute a low concrete dam for the high earth multiple-purpose structure authorized and designed for the Randall site as a major unit of the Missouri River Basin program.

Preliminary work on a dam 160 ft. high and 10,000 ft. long was begun a year ago, but a restudy was undertaken last June at the request of the subcommittee on War Department Civil Functions of the House Appropriations Committee, after Congressman Case of South Dakota had raised the question of the relative merits of a low concrete dam of 30 ft. maximum height.

Report prepared by Omaha office

General Wheeler said that the report on the restudy of the project was prepared by the Omaha district engineer and was received in the office of the Chief of Engineers two weeks ago, together with the review and recommendations of the division engineer for the Missouri River division. Since its arrival in Washington the report has been subjected to intensive study and analysis by Civil Works Department engineers and to personal examination by General Wheeler.

In his letters to Congressmen advising of the Randall Dam decision, General Wheeler said: "The reporting officers find that change to a low dam at Fort Randall would result in serious losses in flood control, navigation and power benefits, as well as in small increases in irrigation costs, which in the aggregate far outweigh the savings which would result from construction of a low dam.

"This report has been reviewed in my office during the last two weeks and I have made personally a careful examination of the report and recommendations on this proposal. As a result of this study, I concur with the reporting officers that substitution of a low concrete dam at Fort Randall would be uneconomical, and that construction of a high earth dam there is necessary to achieve the objectives of the comprehensive plan for the Missouri River Basin which has been authorized by Congress. I have accordingly instructed the division engineer, Missouri River division, to proceed with construction of the high earth dam at Fort Randall."

◆

New report on crossing for San Francisco Bay

With their general approval, the Secretaries of War and Navy last week submitted to Congress a joint Army-Navy Board supplemental report recommending the immediate construction of a $134,468,000 combination causeway and tunnel for highway traffic between San Francisco and Oakland, Calif. The report also recommends the development of plans for an electric rapid transit system which could be carried under the bay.

As now recommended, the causeway-tunnel project would provide six traffic lanes between San Francisco and Alameda. This crossing would include an earthfill section, two trestle sections, and an underwater tube at a depth sufficient to allow a 50-ft. navigational clearance. Between Alameda and Oakland a four-lane tube would be built under the present Oakland Estuary to the proposed East Shore Freeway.

Early this year the board submitted to the heads of the War and Navy departments a report calling for immediate construction of the same type of highway crossing as now recommended (*ENR* Feb. 13, vol. p. 237). The report now being forwarded to Congress is a supplemental study giving special attention to the possibility of constructing the new crossing so that it would also accommodate railroad traffic.

The board in its last study concluded that due to the many complications inherent in a single type of crossing for vehicular, interurban and main-line railroad traffic, the proposed causeway-tunnel should not include provisions for carrying main-line railroads.

However, the board prepared an estimate of the cost of adding two lanes of main-line railroad to the recommended causeway-tunnel, concluding the addition of these rail facilities would cost an additional $96,757,000. The board also estimated that a high level bridge, providing highway and rail facilities equivalent to the causeway and tunnel, and along the same alignments, would cost $177,809,000.

N. Y. City subsidizes rents for low-income families

The New York City Board of Estimate last week authorized the New York City Housing Authority to build 5,678 apartments to rent at $12.50 per room to families for whom neither public nor private homes now are being built.

Six projects are contemplated at an estimated cost of $63,000,000. About 810 apartments will be provided in the Bronx; 1,460 in Long Island City, Queens; 725 in Sheepshead Bay, Brooklyn; 1,605 in two projects in upper Manhattan; and an unspecified number in Staten Island. The structures will be built from plans already made for other low-rent projects, which they will resemble.

The city will guarantee bonds issued by the Housing Authority to finance construction and bear the cost of operating deficits, which are expected to be about $3 per room per month or about $1,770,000 per year.

The present schedule is intended to take care of some of the thousands of veterans and others whose incomes are too high to make them eligible for the 20,771 apartments being built by the Housing Authority with city, state and Federal subsidies and yet too low to enable them to pay more than $12.50 a room.

◆

Contract awarded for the Ft. Hamilton Hospital

A $14,700,000 general contract for the construction of a 17-story, 1,000-bed veterans hospital at Fort Hamilton, Brooklyn, was awarded last week to Cauldwell-Wingate Co. of New York according to an announcement by Col. William F. Heavey, New York district engineer.

This represented a saving of $1,522,000 over the low bid submitted by the contractor July 22. The saving was accomplished by deleting an auditorium and accepting deductible alternates and substitution of material, equipment and interior finishes in line with recent instructions issued by Gen. Omar N. Bradley, administrator of Veteran Affairs (*ENR* Aug. 14, vol. p. 232). Plans for auxiliary buildings, not included in the contract, such as nurses' quarters, garages, and residences for personnel, are also being restudied.

The Fort Hamilton hospital is the second to be awarded by the New York office, the first being the 1,984-bed Franklin D. Roosevelt Hospital at Crugers Park, near Peekskill, which is expected to be finished in 1949.

Building technology division set up

A new division of building technology has been established at the National Bureau of Standards. The new unit is made up of a number of sections and parts of sections which have come to be exclusively concerned with various phases of building technology. It is felt that a unified attack on building problems can be more effectively achieved by concentrating these sections in a single division, though they cut across the classical lines of physics, chemistry, and engineering.

The nucleus of the new division consists of five sections: structural engineering; fire protection; heating, ventilating and air-conditioning; exterior and interior coverings; and codes and specifications. The structural engineering section will deal with the strength, stability, and stiffness of buildings and the structural elements of buildings. The fire protection section will continue its work on fire resistance of building construction, the fire hazard of building contests, and fire detecting and extinguishing equipment.

Heating, ventilating and air-conditioning and heat transfer through materials and constructions will be the responsibility of the heating and air-conditioning sections. The exterior and interior coverings section will handle roofing and waterproofing; floor, wall and ceiling finishes for buildings; and in general the chemical and physical properties of bitumens. The codes and specifications section will carry on work formerly performed in another division on building, plumbing and safety codes and standards, building fixtures and service equipment and construction and maintenance practices.

Research will be limited to the three fields of physics, chemistry and engineering. Broader subjects, such as planning for housing developments, choice of sites, or aesthetic matters, do not fall within the scope of the bureau's activities. However, cooperative work on the development of recommended code requirements and practices will be continued in close association with laboratory research so that the full benefit of such research will be available promptly for the use of national standardizing bodies. One of the major jobs for this year is the preparation for publication of much already-accumulated research data.

While much of the work to be carried on will be primarily for the benefit of other governmental agencies, the bureau believes the results should be useful to the entire construction industry and it is intended that they shall be made available for the purpose. In addition, research problems of interest to the industry as a whole, particularly where no other research facilities are available, will be undertaken to the extent that this can be done.

E. U. Condon, director of the bureau, has named Douglas E. Parsons to head the new division. Parsons, who is a civil engineering graduate of Cornell College, Mt. Vernon, Iowa, and a member of the American Society of Civil Engineers, was formerly chief of the mineral products division of the bureau. G. N. Thompson, formerly chief of the old codes and specifications division of the bureau, has been advanced to the much more important position of assistant chief of the new organization.

◆

New simplified practice for plumbing fixtures

A voluntary Simplified Practice Recommendation for plumbing fixture fittings and trim for housing has been approved for promulgation, according to an announcement of the Commodity Standards Division of the National Bureau of Standards. The recommendation will be identied as R227-47 and will be available in printed form on or about Sept. 15.

INDIAN ENGINEERS STUDY U. S. HIGHWAYS BY TAXI

Last April P. L. Varma and N. R. Ramchandani, leading highway engineers of India, hailed a taxicab in Washington, D. C.

"Where to?" asked the taxi man.

"We want to tour the United States" was the reply.

In San Francisco this month driver Jimmy Smith said, "They just tell me where to drive 'em and I drive 'em there. It's all right with me." He says the meter eventually will add up to more than $1,500.

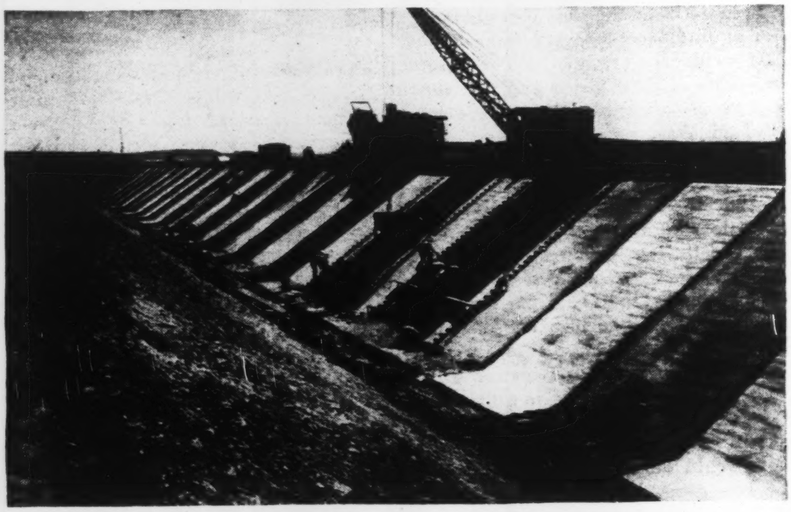
Mr. Varma said: "If you want to study roads you don't travel by train."

Construction to start on Utah gas pipeline

With surveys nearly completed, construction will soon get under way on a 37-mi. $10\frac{3}{4}$-in gas pipeline from Salt Lake City to Provo, Utah. The project will cost an estimated $850,000.

The line will be built by the Mountain States Fuel Co. on an order from the Utah Public Service Commission that a steady supply of natural gas be furnished to the Provo area.

At the present time Provo depends on artificial gas from a plant at Ironton, where an uncertain coal supply caused several interruptions in service during the past year.



***Putting in Lining**—Lining the banks of the main distribution canal system for the Columbia Basin project has started east of Soap Lake, Wash., where draglines are pouring $4\frac{1}{2}$ in. slabs in strips 13 ft. 10 in. wide. Hoists pull vibrator screed up the embankment, and finishing is done by hand. Utah Construction Co. and Winston Brothers hold the contract for the work.*

Court action may delay Philadelphia projects

State and municipal construction projects that involve evictions face a possible delay of six months under a preliminary ruling handed down in the United States District Court in Philadelphia, Pa., recently.

The ruling by Federal Judge Guy K. Bard did not settle the question but left the issue wide open, raising the possibility of new delays on the multimillion dollar Vine Street widening project and similar highway projects.

Judge Bard said the Commonwealth of Pennsylvania might be a landlord under the 1947 Housing and Rent Control Law. His ruling came on a suit asking for issuance of an injunction to restrain Pennsylvania from evicting occupants of six properties on Vine Street. The state condemned the properties five years ago and has paid for them. Not being prepared for construction during the war, the state rented the properties, on leases which included a 30-day termination clause.

The state contends that it is not subject to the OPA act when it rented the buildings in 1942.

If Judge Bard rules in favor of an injunction action all projects involving evictions will be delayed for six months. It is understood however that if such be the case the question will be carried immediately on appeal to the higher federal courts.

Respondents in the suit are Ray F. Smock, Pennsylvania State Highways Secretary; C. W. Woolworth, Secretary of Property and Supplies; and Attorney-General T. McKeen Chidsey.

◆

Navy will construct Trenton, N. J., laboratory

Congressional approval is being sought by the Navy to construct a $26,750,000 aeronautical turbine laboratory at Trenton, N. J. The project is being sought by the Bureau of Aeronautics and it would be used to test and develop jet-propulsion aircraft engines. The facilities are planned for proof testing and not for research. Full scale engines would be tested under simulated altitude conditions.

Land owned by the Reconstruction Finance Corp. adjacent to Mercer County Airport would be used.

A total of $17,000,000 is sought for the first year's construction program. Work would include the building of a power plant with a total capacity of 90,000 hp.

Wide World photo

***N. Y. City Housing Project**—One of the 6-story concrete buildings in the $14,000,000 James Weldon Johnson low-rent housing project of the New York City Housing Authority is shown above. Quarters for 1,310 families will be provided in ten buildings, ranging in height from 6 to 14 stories and covering about 19 percent of the 12-acre site between E. 112th and E. 115th Streets and between Park and Third Avenues in uptown Manhattan. Wilaka Construction Co. are general contractors, and Knickerbocker Concrete Arch Construction Co. is doing the concrete work.*

Seminar to be held on "Fracturing of Metals"

A seminar on "Fundamental Relations In the Fracturing of Metals", sponsored by the American Society for Metals and co-ordinated by the Case Institute of Technology, Cleveland, Ohio, will be held as a special 2-day technical program of the ASM Annual Meeting to be held in Chicago in October. Sessions will be held at the Palmer House on Saturday and Sunday, October 18-19, as a part of the 29th Annual National Metal Congress and Exposition, Oct. 18 to 24.

NEW TOWN FOR OLD

Officials of Butler, Tenn., are going ahead with plans for construction of the new town of "Carderview," which will house the citizens after their present townsite has been covered by the waters behind Wautauga Dam.

It will be laid out and constructed according to general plans furnished by the Tennessee Valley Authority and the Tennessee Planning Commission. With T.V.A. paying the bill, business houses, homes and churches will be constructed.

The new town is being named for Rev. M. H. Carder, a minister of Butler who has been very active in planning it.

Prefabricated housing to total 50,000 units

During 1947 the shipment of prefabricated houses is expected to total 50,000 units, according to the Office of the Housing Expediter. During the first six months of this year about 15,000 units were shipped, but a much greater rate of sales is expected during the last half of 1947. The 50,000 figure compares with 37,000 prefabricated units produced in 1946.

Last year the shortage of materials, particularly plywood, held up the prefabrication work, but most materials are now available in fairly good supply. Establishment of dealers interested and able to finance the sale of this type of housing has also been a problem slow of solution, since these firms must be able to take on a good sized financing program as well as establish a staff to do the field construction work.

Cost of prefabricated homes, like all types of construction, is now high and is the present major problem delaying sales with prefabricated homes. However, the Prefabricated Home Manufacturers Institute, which has an active membership of 56 firms, reports that this problem is being eased by the fact that many prospective home buyers have concluded that housing costs are going to remain high for some time to come.

PERSPECTIVE . . . .

Why Truman Vetoed the Science Foundation Bill

Creation of a National Science Foundation to centralize government financing of scientific research and training now appears unlikely for at least several years. Likely this fall, however, is presidential creation of a federal coordinating committee to oversee existing programs of federal aid to science—eliminating duplication, setting policy, and attempting to prevent waste of scarce scientific manpower.

President Truman's veto of the Science Foundation legislation harks back to 1944. At that time President Roosevelt and his advisers were impressed by the tremendous military-technical developments resulting when huge sums of war money were pumped into scientific laboratories. Fearing that the war's end would dry up money for science, President Roosevelt commissioned Vannevar Bush, chairman of the wartime Office of Scientific Research and Development, to work up a plan for postwar federal support of science.

Although Mr. Bush and the other older statesmen of the learned world with whom he consulted realized the need for government money, they were fearful that too much government direction might go with it. Therefore they recommended insulating the foundation with an organization very similar to that provided in the bill which Truman vetoed this month—control by a part-time board of scholars and public leaders who would appoint the agency's executive staff.

Bush's basic idea received immediate and almost universal support. But there was bitter controversy over the details:

One sore point was the plan for an autonomous board practically removed from administration control. Professional administrators thought it completely unsound to entrust expenditure of public funds to a group of private citizens.

Widespread resentment over military influence in science tended to center on this point too. Also deeply controversial was the question of patent policy. Some advisers of the administration were insistent on a provision that results of all government financed research be thrown open to the public—a policy which the Bush report had opposed.

The first round was won last year by putting through the Senate a bill sponsored by Senator Kilgore of West Virginia. It provided for control by a single presidentially-appointed administrator and incorporated a no-patent clause. But opposition pressure was strong enough to smother the bill in committee in the House.

This year the Science Foundation bill was introduced by Senator Smith of New Jersey. The new version went back to the original Bush proposal. It created a foundation of 24 part-time members, who would appoint an executive committee of nine part-time members, who in turn would select a full-time director. The bill took no position on the patent question. Late in the session, the bill was picked up by the Republican leadership, passed, and sent to the White House.

Meanwhile, however, White House advisers on science matters had initiated a new group of studies of the postwar estate of science to take the place of the Bush report. These are due for publication in the fall, but they have already indicated that the situation is considerably different from what was expected during the war. Because of continued large military appropriations, revived industrial expenditure, and availability of GI scholarships for most science students, there's no lack at all of money for science.

The White House conclusion is that the immediately urgent need is for careful coordination of federal expenditures to avoid waste of manpower through overlapping projects and to see that important fields are not neglected while minor work goes ahead. For this job, it was felt, an autonomous part-time foundation was completely unequipped. Such a semi-governmental body could hardly give direction to governmental work.

In rejecting the bill, President Truman emphasized its "departure from sound principles of administration. . . . So complex and unwieldy that it would impede rather than promote. . . . Full governmental responsibility and authority would be placed in 24 part time officers whom the President could not effectively hold responsible for proper administration."

High costs increase price of cement

Six eastern Pennsylvania cement manufacturing firms have announced price increases. Company officials said the increases were caused by rising costs of coal and labor. Cement producers use about 100 lb. of coal in the manufacture of each barrel of cement, the officials pointed out.

The Lehigh Portland Cement Co. and the Nazareth Cement Co. made a price increase of 10c per barrel on cement in paper and cotton bags and 15 cents on cement in bulk effective Aug. 16. Similar price increases to be effective late in August were announced by the Alpha Portland Cement Co., Hercules Cement Co.; Whitehall Cement Co.; and the Pennsylvania Dixie Cement Co.

Recent cement price raises in other cities have been reported as follows:

	Cloth	*Paper*	*Bulk*
Baltimore, Md.	10¢	15¢	15¢
Denver, Colo.	10¢	15¢	15¢
Los Angeles, Calif.	20¢	20¢	20¢

◆

Ont. Hydro to harness Mississagi River

The Ontario Hydro Electric Power Commission has started preliminary work on its plan to harness the Mississagi River in northern Ontario. Located 53 miles east of Sault Ste. Marie, the proposed plant will develop 58,000 h. p. at 60 cycles and is expected to be completed by 1950.

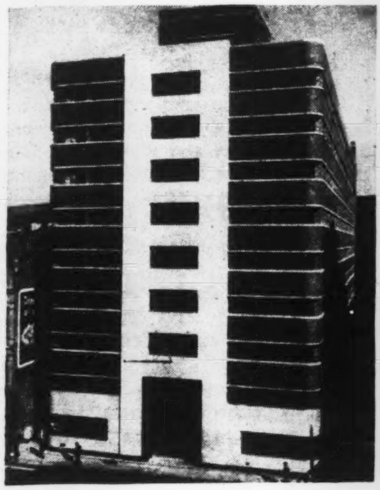
An 850-ft. diversion tunnel will be required. Charles MacGregor, of Sault Ste. Marie, is engineer-in-charge.

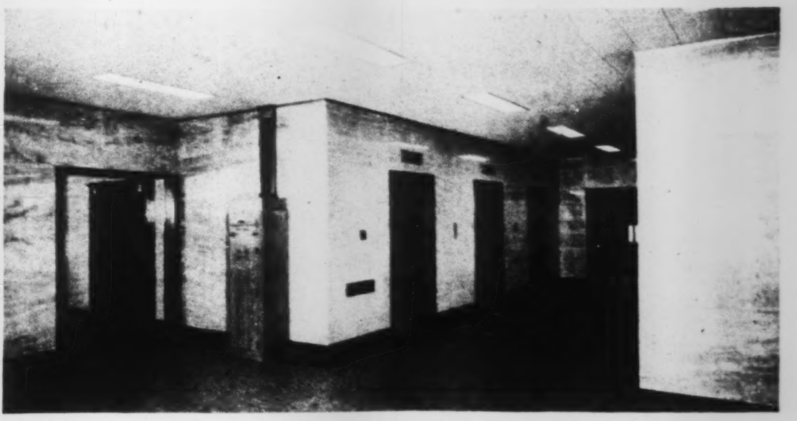
PEACETIME USE FOR INCENDIARIES

Debris on Seattle City Light's Ross Lake in the Cascade Mountains will be destroyed through the use of four carloads of "goop," a highly inflammable compound which during the war was developed for incendiary bombs.

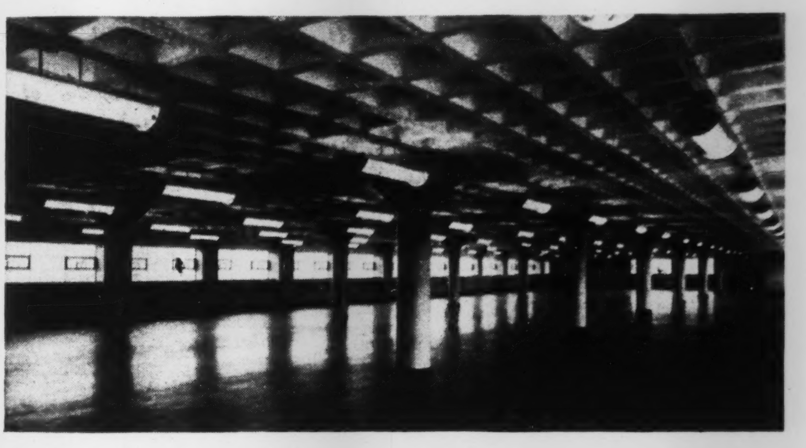
When Ross Dam is finished, Lighting Superintendent E. R. Hoffman explained, more than 12,000 acres of forest land will be flooded. Debris that will rise from the forest will be rounded up by motorboat and towed to shallow water. The lake will be slightly lowered, then, he said, and the drying debris treated with the inflammable compound and burned.

City Light obtained the compound, principally a mixture of gasoline jelly and aluminum powder, from the War Assets Administration for shipping costs.





***Space for** the regional office of the Veterans Administration at Wilkes-Barre, Pa., is provided in the recently-completed 9-story brick and limestone building shown at left. The lobby (above) has terrazzo floors, polished travertine marble walls and hung acoustical tile ceilings, with troffer-type fluorescent lights. The structure is of reinforced concrete flat-slab construction (below). Floors in the office areas are finished with asphalt tile, and heating is done by means of concealed convectors.*



V. A. office building finished on schedule

Constructed during nine months in 1946 and 1947, the recently completed regional office of the Veterans Administration at Wilkes-Barre, Pa., was kept exactly on schedule despite strikes, rising wages, difficulty of obtaining materials and transportation problems.

The structure is owned by Wyoming Valley Veterans' Building, Inc., a corporation formed for the express purpose of providing offices for the Veterans Administration when available space became so scarce that it appeared that the VA might seek suitable quarters outside Wilkes-Barre. Working drawings and specifications were completed by Lacy, Atherton, Wilson & Davis, architects and engineers, and a contract was negotiated with the Sordoni Construction Company to complete the building at a cost not to exceed $1,150,000. Actual cost, excluding architect's fees, was about $1,120,000.

Ground was broken on Sept. 3, 1946, and the structure was turned over for occupancy on June 1, 1947.

Design details

The building consists of nine stories and a basement, 70x240 ft. in plan, with 140,000 sq. ft. of net usable space. The exterior is faced with common red brick, trimmed with Indiana limestone. Windows are steel, projected types; window lintels, reinforced concrete; window sills and coping, limestone; and stools slate, with the space below plaster on tile furring or occupied by recessed convectors. The main entrance trim and base are verde antique polished marble panels.

The structural frame is reinforced concrete, and the floor construction utilizes a patented grid flat slab system. Column spacing in the long direction of the building is 26 ft., and in the short direction about 22 ft. in the end bays and 25 ft. in the center.

In general, concrete is left exposed and painted. Floors are covered with asphalt tile, except the first floor lobby which is finished with dark green terrazzo.

Other variations used in the lobby include walls of polished travertine marble, hung acoustical tile ceilings with troffer-type fluorescent lights, and main entrance doors of glass with metal trim.

Stair towers are reinforced concrete, with structural glazed tile walls and kalemein doors and frames. There are three fire towers, one in front of the building back of the elevators, and two at the rear, one of the rear stairs extending only from the first to the sixth floor.

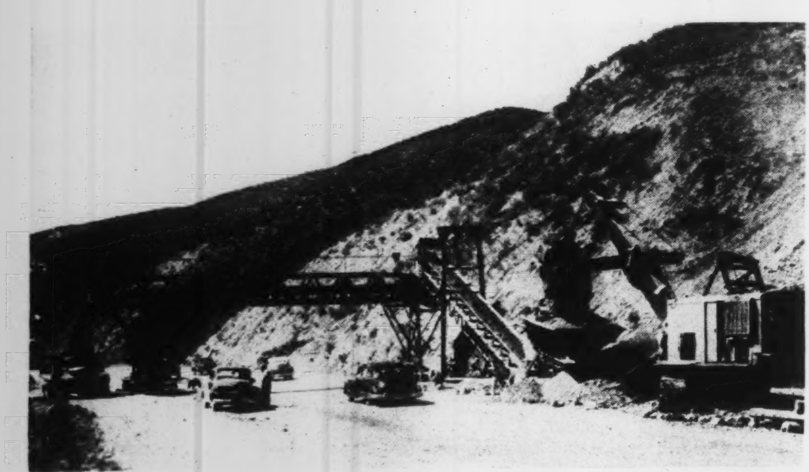
Three fully automatic, self-leveling passenger elevators, rated at 500 fpm., and one freight elevator are also provided in the design.

Toilet rooms are arranged on both sides of a pipe shaft in the front of the building, opposite the elevators. This pipe shaft extends to the penthouse and serves for ventilation of the toilet rooms. Except in the basement, all pipes are concealed throughout the building.

Steam for heating is supplied from a public system to the concealed convectors, with consumption measured by metering the condensation.

Convenient electrical system

Lighting is provided throughout by fluorescent fixtures to give an intensity of 20 foot-candles at desk level. Convenient outlets are provided all around the outside walls, as well as two lines of underfloor ducts, extending the full length of the working space. Distribution conduit system is provided for telephone service.



Combination Elevator-Conveyor—*To avoid interference with traffic on a busy highway, the Clyde W. Wood Co., contractor, in cooperation with the California State Highway engineers, built this movable conveyor rig for widening operations on the Ridge Route section of Highway 99 in Southern California. Built in one month at a cost of $30,000, it consists of a loading hopper into which power shovels dump earth and rock from the slide. An inclined elevator hoists the material 25 ft. and a conveyor with a 40-in. rubber belt carries it across the highway to a chute from which it is dumped into waiting trucks. The highway at that point hugs the shoulder of a mountain and no detour could be built; neither could traffic be halted on the 4-lane highway which is said to be the most heavily traveled freight arterial in the West. The 100,000 cu. yd. of earth to be moved here is about one seventh of the total in the 2.6-mile widening project.*

Poorly built, high priced houses remain unsold

Shoddy construction and high prices are given as reasons why at least 2,000 new homes in Atlanta, Ga., have remained unsold.

A recent survey disclosed that these dwellings were being offered "for sale" only, although there is a critical shortage of housing facilities and a great rental demand. Real estate operators claim that the dwellings are not selling because of inflated prices for inferior quality; location in areas which lack school, church and transportation facilities, and shoddy construction which makes loans difficult or impossible.

Roy Tippin, secretary of the Home Builder's Association, estimated that there were between 500 and 800 houses unoccupied and most were "jerry-built shacks put up by carpenters' helpers and not by reliable contractors."

He laid the blame for some of the unsold houses on low appraisals by the Veterans Administration and to the "carpenters" helpers trying to get rich quick by posing as builders." However, the VA denied that appraisals were too low, stating that the appraisers are builders and real estate men.

Provide group insurance for construction men

Perhaps for the first time in the history of the building trades, a general contractor has provided his hourly construction workers with the benefit of group insurance protection. Approximately 125 men now employed by the Damon G. Douglas Co. of 605 Broad Street, Newark, N. J., have been covered by a policy written by The Prudential Insurance Co. of America.

Every workman will be covered by life insurance to the extent of $500 upon completing one week of employment. After he has worked six months he will also qualify for weekly benefits in case he is incapacitated by reason of sickness or accident other than disabilities covered by workmen's compensation, and after one year he is to be given hospitalization insurance. The entire cost of the insurance program is being borne by the Douglas company.

Workmen will built up seniority; every day they work, starting from last Jan. 1, will be counted and after a man has accumulated the equivalent of two years of service his benefits will increase. There will be other increases at the end of three, four and five years.

Groundwater surveys in upstate N.Y.

Cooperative ground-water investigations of the U. S. Geological Survey and the New York Water Power and Control Commission, consisting of county by county surveys, have been started in a second regional area of upstate New York. A total appropriation of $50,000 for the current year has been made available on an equal basis by the state and federal legislatures for continuation of the statewide work begun in 1945.

The second regional area of systematic study is the west-central section of New York State extending from Lake Ontario to the Pennsylvania border and including the counties of Seneca, Wayne, Monroe, Ontario, Yates, Schuyler, Chemung, Steuben, Allegany, and Livingston. The first investigational area including ten counties in and around Albany is nearing completion. Published reports on the ground-water resources of each of these counties will be released soon.

◆

Seattle district assumes Portland district work

The Seattle, Wash., district, U. S. Army Engineers, has taken over all military construction projects formerly under the supervision of the Portland, Ore., district, Col. I. H. Hewitt, district engineer at Seattle, has announced.

Two projects are affected at present—work at the Umatilla Ordnance Depot and housing for the Army Air Forces at the Mountain Home, Ida., airport. The Portland district, under Col. O. E. Walsh, will continue to supervise Veterans' Administration hospital projects and civil works in that area.

WHOLE PIPELINE STOLEN

An entire emergency water line of 1,235 ft. used by the Borough of Shenandoah, Schuylkill County, Pa., during dry spells was dug up and stolen recently.

Officials discovered the theft when they went to turn on the water from the emergency line and no water was forthcoming. The pipe had been dug out section by section in a period of 25 days. Police arrested six young men and charged them with having sold the pipe to junk dealers.

Borough Solicitor Martin D. McGuire said it would cost at least $15,000 to replace the water line.

OBITUARY

Thomas J. Waters, 80, who founded the building contractors firm of T. J. Waters & Sons, New York City, 50 years ago, died Aug. 27. Before his retirement 10 years ago, Mr. Waters had directed the construction of many important buildings, including the Brooklyn Public Library and the first unit of Hunter College in the Bronx.

George Lynn Sarsfield, Sr., 86, retired civil engineer, died Aug. 17 in Asheville, N. C. He was well known for his work throughout the United States, Canada, Cuba, Mexico and South America.

Peyton B. Burkhalter, officer of the S. S. Jacobs Construction Co., Jacksonville, Fla., died Aug. 19. A graduate of Alabama Polytechnic Institute in engineering, Mr. Burkhalter joined the Jacobs firm in 1916 in Birmingham and later rejoined it in Jacksonville in 1928 after serving in World War I.

George M. Painter, 81, at one time a construction engineer with the Pennsylvania Railroad, died Aug. 18, at Havertown, Pa. He assisted in the building of the Schuylkill Valley branch of the Pennsylvania Railroad. He was a graduate of Lehigh University.

Richard R. Ferguson, 64, Girard, Ohio, civil engineer, died Aug. 23. He was an assistant city engineer.

Carl H. Fuller, 69, Youngstown, Ohio, died Aug 21. He had retired in 1945 as a civil engineer for the Carnegie-Illinois Steel Corp. He was formerly chief engineer of the Cook Construction Co. in Des Moines, Ia.

Dana M. Pratt, 77, civil engineer, died Aug. 19 in Hanson, Mass. For several years he was with French & Bryant, and is believed to have been the first party chief to survey a forest area by the plane-table method. In 1902 he joined the J. H. Sullivan Co. of Brighton, working through New York and New England. Since 1920 he conducted his own firm.

Stanley H. Engel, 65, manager of the Milwaukee, Wis., chapter of the Associated General Contractors of America and the Building Trades Employers' Association for 29 and 13 years, respectively, died Aug. 15.

J. I. English, 45, Toronto, Ont., construction engineer, drowned Aug. 18 when his canoe capsized. A graduate of Toronto University, he specialized in theater construction and had 19 Canadian theaters in construction.

George E. Ahern, 74, for many years town engineer and superintendent of public works, Arlington, Mass., died Aug. 24. Mr. Ahern was a graduate from Tufts College, class of 1898, and had worked for his home town for nearly 40 years.

Vernon J. Gasper, 58, supervising engineer for Moore & Owen and employed in the Indianapolis, Ind., city engineer's office from 1906 to 1915, died Aug. 17. He previously was supervisor of construction for the Standard Oil Co. of Indiana for 15 years and served in the army in 1916–18.

Edward C. Gleason, 64, Norwich, Conn., municipal street commissioner, died recently. He was appointed street commissioner July 1 for the third consecutive 1-year term. He had served in the same office previously from 1931 through 1937. Mr. Gleason had served as vice-president of the Association of Connecticut Highway Officials.

Henry Best Bruton, 63, superintendent of public works at Tabor City, N. C., for 18 years, died recently.

MAJOR MEETINGS

American Association of State Highway Officials, 33d annual meeting, Waldorf-Astoria Hotel, New York City, Sept. 22-26.

Associated General Contractors of America, Inc., fall meeting, Savery Hotel, Des Moines, Iowa, Sept. 28-Oct. 1.

Institute of Traffic Engineers, 18th annual meeting, Hotel Fort Shelby, Detroit, Mich., Oct. 1-4.

National Safety Council, annual convention, Stevens Hotel, Chicago, Ill., Oct. 6-10.

American Society of Civil Engineers, fall meeting, Roosevelt Hotel, Jacksonville, Fla., Oct. 13-17.

National Metal Congress and Exposition, Palmer House, Chicago, Ill., Oct. 18-19.

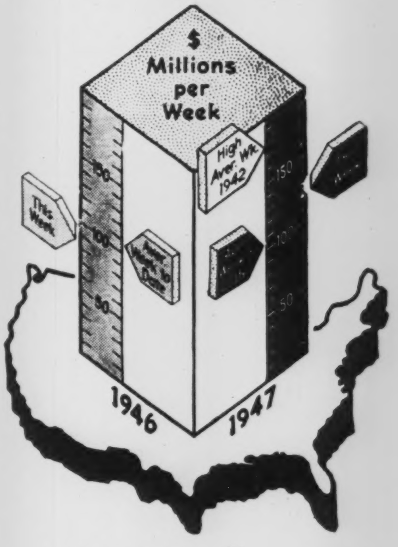
American Welding Society, annual meeting, Sherman Hotel, Chicago, Ill., Oct. 20-24.

Engineers' Council for Professional Development, 15th annual meeting, Mount Royal Hotel, Montreal, Canada, Oct. 24-25.

National Council of State Board of Engineering Examiners, 26th annual meeting, Hotel Pennsylvania, New York, N. Y., Oct. 27-29.

News of the Week
(*Continued on page* 154)

CONSTRUCTION ACTIVITY



As Reported this week to . . .
Engineering News-Record

CONTRACT VOLUME

Continental U. S. Only (Thousands of Dollars)

	Week of Sept. 4 1947	Cumulative 1947 (36 wks)	Cumulative 1946 (36 wks)
Federal	$3,610	$456,683	$493,199
State & Mun.	28,884	1,168,880	965,702
Total Public.	$32,494	$1,625,563	$1,458,901
Total Private	90,272	2,108,800	2,313,005
U. S. Total	**$122,766**	**$3,734,363**	**$3,771,906**

WHERE CONSTRUCTION ACTIVITY ORIGINATED THIS WEEK

Dollar Volume (Thousands)

Type of Work	This Week	Cumulative 1947 (36 wks)	Cumulative 1946 (36 wks)
Waterworks ...	$1,026	$75,007	$70,169
Sewerage	974	91,489	68,700
Bridges	2,691	118,567	95,983
Highways	18,053	562,291	558,578
Earthwork, Waterways	1,462	200,202	266,632
Buildings, Public	6,846	397,048	274,629
Industrial ...	4,588	564,964	711,012
Commercial ..	74,419	1,241,085	1,454,640
Unclassified ...	12,707	483,710	271,563

NOTE: Minimum size projects included are: Waterworks and waterway projects, $22,500; other public works, $40,000; industrial buildings, $55,000; other buildings, $205,000.

NEW PRODUCTIVE CAPTAL

	Cumulative 1947 (36 wks)	Cumulative 1946 (36 wks)
NON-FEDERAL	Current	$1,143,472
Corporate Securities	Figures	327,638
State and Municipal	Not	590,834
Fed. Aid Highway.	Available	225,000
FEDERAL	....	1,714,695
Total Capital	....	**$2,858,167**

ENR INDEX NUMBERS

Index Base = 100	1913	1926
Construction Cost..Aug.'47	415.00	199.49
Building Cost.....Aug.'47	313.03	169.21
Volume ....July '47	222.	97

EDITORIALS

VOLUME 139 NUMBER 10

September 4, 1947

Water from Heaven

EXPERIMENTS in the Arizona desert a few weeks ago, which were said to be successful in producing rain from clouds with the use of dry-ice pellets (*ENR* Aug. 7, vol. p. 169), raises at least one interesting question. Did these clouds originate in neighboring California, and if so, what prior claims to this moisture might be made? In view of the long-standing controversy between Arizona and California over the allocation of other waters in the region it seems entirely possible that an already complicated situation easily could be worsened. Of course, Arizona might argue that the moisture in California clouds passed over that state without being appropriated for beneficial use—the beneficial-use philosophy being pretty potent stuff in the semi-arid Western regions—but California, with equal justice, might point out that these clouds were formed with water that was actually being put to beneficial use in California when it became airborne by capricious wind-currents moving eastward. With all the solemnity that can be mustered on an August day in New York that is just dripping with humidity, we feel compelled to warn Arizona that these new-fangled ideas of making rain may be all right, but it may be dangerous business to be fooling around with clouds from over California. That may not be water from Heaven.

Bridge Piers Wait for Steel

ONE of the most prominent reminders that our industrial system is not yet back to normal is presented by the number of completed bridge piers standing idle, waiting for steel. California has a considerable number of sites where piers have been completed, and structural steel was either found too costly or not to be had at all. At Tacoma Narrows in Washington piers of the collapsed suspension bridge are practically ready for the new towers, and bids are to be called soon on a $10,000,000 bond issue. However, best estimates are that no steel for the towers can be expected for more than a year. At Memphis, Tenn., recently completed piers for a great bridge wait without even a prospective date for completion of the structure; terms on superstructure steel were such that when they were rejected no new call for bids was issued. Bridge piers thus standing idle throughout the country are silent monuments to the interdependence of modern industrial activity. When we find that a highway bottleneck in California or the Northwest is imposing a serious handicap on nearby industries, the cause may not be a local one at all. It may stem from a coal strike in the Southeast, insufficient capacity in our steel mills or any number of other reasons reflecting lack of balance in our industrial pattern.

Salvaging Cast-Iron Pipe

UNDER TODAY'S CONDITIONS of rising prices and continuing shortages, the rehabilitation of used cast-iron pipe commands more than usual interest. In this connection the methods for cleaning and lining pipe with cement mortar at Atlanta (see p. 93) provide a number of ideas. Using maintenance forces and shop-built equipment, the Atlanta waterworks engineers have salvaged some 18,000 ft. of old, highly tuberculated 8-in. pipe at a cost of 25c. per linear ft. Although rehabilitation measures of this kind are not new to waterworks men, the special procedures developed at Atlanta should prove helpful to others who may be contemplating similar salvage operations.

Costly Interruptions

WORK is started at several dams being built by the federal government; at the same time work is stopped at nearly as many other federally financed dams. Thus, in brief, reads a news round-up of current activities on dams in our August 28 issue, vol. p. 290. Economy in federal construction is much to be desired, but there can be no real economy in stopping projects that are already under way because funds allocated to them are exhausted while starts are being made on projects of other federal agencies because funds to start work on them happen to have been made available by Congress.

It can be argued that the interest of the government is protected by the clause always put in government contracts stipulating that in case the Congress fails to appropriate money for continuation of the work the contractor shall have no recourse. But every prudent contractor, when preparing his bid, has considered the probabilities of inadequate appropriations and has included in his contingent items an amount to cover loss through such delay.

If job shutdowns for lack of appropriations continue at the current rate the inevitable consequence will be greatly enlarged contingency items in bids to add to the already high construction costs. This possibility should cause the Bureau of the Budget to recommend to Congress that, in appropriating money for federal construction agencies, consideration be given to assuring adequate annual appropriations for each project after it has been started, even if that means delaying the start of work on projects of other federal agencies.

Traditions Die Hard

TRADITIONS have surprising virility. One that dies hard is the claim that obtaining engagements for engineering work is not a competitive business and that there is something inherently wrong in competitive bidding for such work.

Among the widely accepted opinions used to support this tradition are those given by M. H. Klegerman (*ENR* Aug. 21, vol. p. 275) and Richard H. Price (*ENR* April 17, vol. p. 579) in commenting on editorials in this journal recommending that competitive proposals for engineering work be sanctioned by the profession (*ENR* Jan. 9, vol. p. 33 and June 26, vol. p. 997). Both Mr. Klegerman and Mr. Price err in assuming that this journal in suggesting to the engineering profession that it sanction competitive bidding for engineering engagements is asking the profession to capitulate to "unscrupulous practitioners". That is farthest from our thoughts. We were concerned only with activities of reputable engineers when we suggested that the profession remove from its codes of ethics or codes of practice the actual or implied restrictions against competitive bidding and that it set up rules under which its members may submit competitive proposals free of the stigma that now attaches to such proposals.

What Mr. Klegerman and Mr. Price overlook is the fact that competitive proposals are now being submitted openly by some of the foremost engineering firms in this country—firms that have the courage to defy unrealistic code restrictions in the knowledge that there is *nothing fundamentally wrong* in such proposals so long as sound business standards are applied to their preparation. These engineers may not favor competitive bids as a means for obtaining engineering services, but they recognize the right of a public contracting agency to call for such bids when it believes such a procedure to be in the public interest.

Under a system of competitive bidding which would recognize that right we see no bar to continued application of the "individual standards of integrity and social responsibility" that Mr. Klegerman holds to be essential to professional conduct, nor do we see any reason for discontinuing the preliminary discussions between engineers and the representatives of the public agency that he believes are so necessary to the rendering of effective engineering services. Such discussions would help to insure that final award of a contract would not be based on price alone.

The main difference between this competitive-bid system and the present system would lie in the fact that, after these preliminary discussions, the proposals of the several interested engineers must be put in the form of sealed bids to be publicly opened on a specified date. Approval of such a system would make it possible for engineers who wish to adhere to the spirit of the profession's code of ethics to offer their services to cities or other public agencies whose legal advisers hold that they must call for bids for engineering work above a specified amount. Codes that bar competitive bidding have the effect of denying the services of some of the best engineers to cities in this class.

Approval of competitive bidding for engineering services under rules set up by the profession will not eliminate all the evils of the present system, but it will definitely put an end to one of the worst evils, that of "shopping" the proposals of firms who are actively competing for a particular job despite their lip service to a code that prohibits competition. But its chief advantage would lie in eliminating from codes of ethics restrictions that are continued in a vain effort to perpetuate the outmoded tradition that seeking engineering engagements is not a competitive business. Those restrictions are forcing reputable engineers to violate the codes to get jobs for which they feel especially well-qualified, thus making a mockery of documents that are fundamental to the professional system.

ENGINEERING NEWS-RECORD
Copyright, 1947, by McGraw-Hill Publishing Company, Inc.
WALDO G. BOWMAN, *Editor*, EDWARD J. CLEARY, *Executive Editor*
New York: V. T. BOUGHTON, R. K. TOMLIN, H. W. HUNT, E. E. HALMOS JR., T. D. MacGREGOR, JOHN C. BUMSTEAD and F. S. MERRITT
Chicago: V. B. SMITH, *Cleveland:* J. R. CARR, *Washington:* A. N. CARTER, *San Francisco:* N. A. BOWERS, L. L. WISE
EDITORIAL OFFICES: 330 WEST FORTY-SECOND STREET, NEW YORK, N. Y.

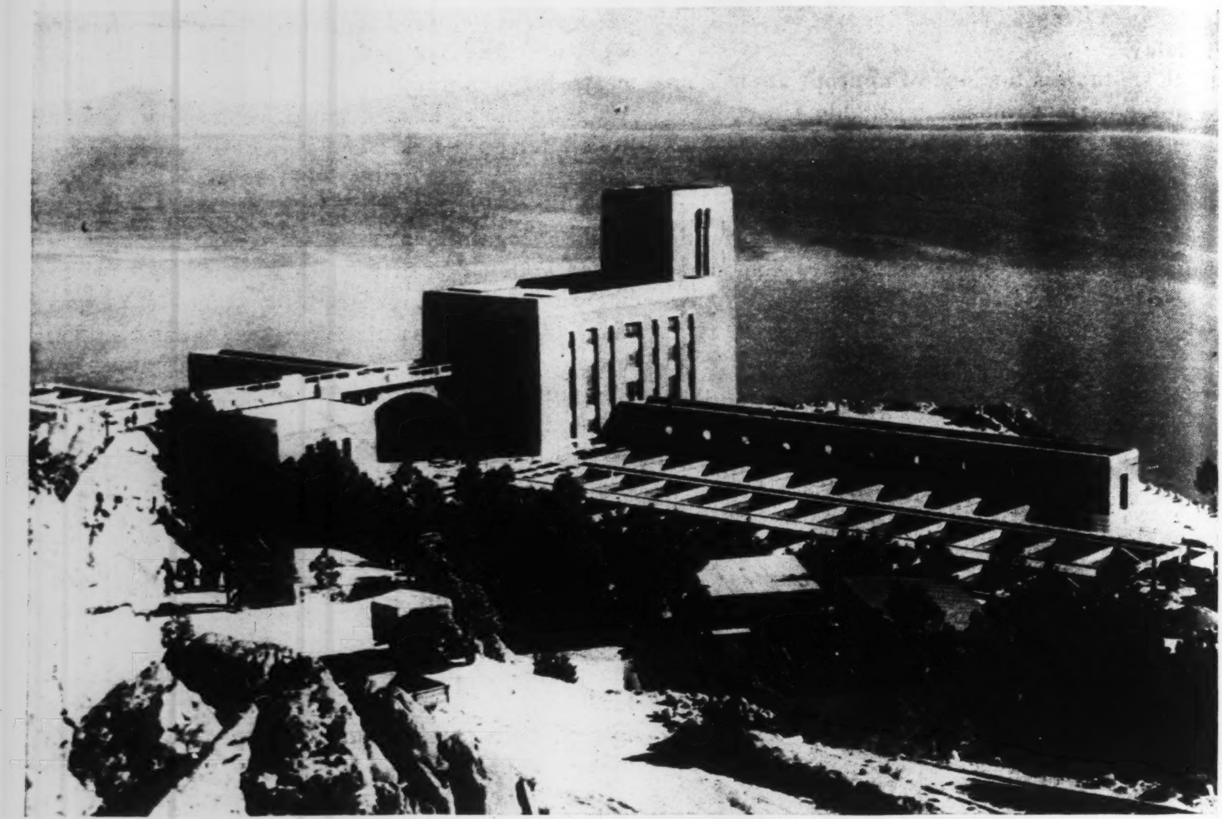


Fig. 1. Steenbras filtration works which serves Capetown, South Africa, is located about 30 mi. from the city on a mountainside 1,000 feet above the sea. Access road passes over power house and arch bridge into chemical building.

Waterworks Showplace In South Africa

Contents in Brief—*Water reaching Capetown's Steenbras filtration works has sufficient head to produce 320 kw. of electrical power for use in plant operation. This new plant, a showplace built on a mountainside, 1,000 ft. above the sea, provides 25 mgd. of chemically-settled, filtered and sterilized water for one of South Africa's largest cities. It includes a powerhouse, mixing chambers, six sedimentation basins, 20 rapid-sand filters, a chemical building and clear well.*

FOR MANY YEARS untreated water taken from moorlands on Table Mountain was delivered to the city of Capetown, South Africa. Two detrimental characteristics, acidity and a light brown color, caused excessive pipe maintenance costs and consumer dissatisfaction. But initial efforts to remedy this situation by construction of a full-capacity water treatment plant met defeat. However, treatment studies and tests were carried forward in two pilot plants; one of 0.3 mgd. capacity was built in 1933 and the other, ten times as large, was completed in 1938.

Simultaneously, a program of promotional education that eventually overcame the loudly proclaimed and questionable objections of burdensome investment and necessity for so-called "medicinal" processing was instituted. Public approval was obtained finally and the Steenbras filtration plant was completed during World War II in spite of the fact that equipment and materials were restricted rigidly. The two pilot plants and the Steenbras project cost about $400,000 and $1,600,000 respectively.

Situated about 30 mi. from Capetown, the new plant overlooks the sea from an elevation of about 1,000 ft. To reach the site a 3-mi. stretch of road requiring 70,000 cu.yd. of excavation was built from the main highway. Preparation of site required removal of an additional 80,000 cu. yd. of earth and rock.

Treatment facilities outlined

Features of the attractive treatment works include: A central chemical building surmounted by a tower; two filter operating galleries extending from the sides of the central building; ten open, rapid-sand filters behind each gallery; three sedimentation basins for each filter bank; a power station directly behind the main

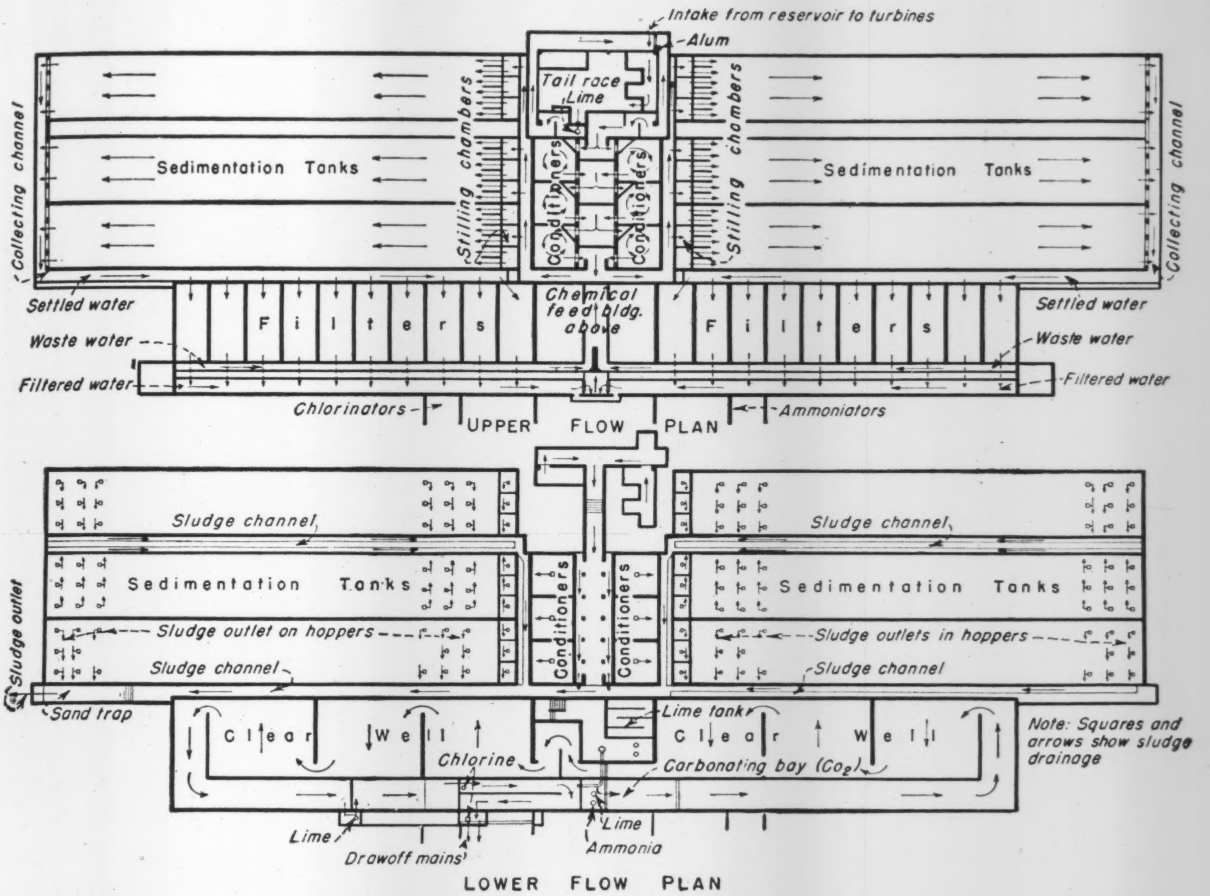

Intake from reservoir to turbines
Alum
Tail race
Lime
Sedimentation Tanks
Stilling chambers
Conditioners
Conditioners
Stilling chambers
Sedimentation Tanks
Collecting channel
Collecting channel
Settled water
Waste water
Filtered water
Filters
Chemical feed bldg. above
Filters
Settled water
Waste water
Filtered water
Chlorinators
UPPER FLOW PLAN
Ammoniators
Sludge channel
Sludge channel
Sedimentation Tanks
Conditioners
Conditioners
Sedimentation Tanks
Sludge outlet
Sludge outlet on hoppers
Sludge outlets in hoppers
Sludge channel
Sludge channel
Sand trap
Lime tank
Clear Well
Clear Well
Chlorine
Carbonating bay (Co2)
Note: Squares and arrows show sludge drainage
Lime
Drawoff mains
Lime
Ammonia
LOWER FLOW PLAN

Fig. 2. Two-level flow plans show how inflow is taken from the powerhouse tailrace, passed through mixers and conditioners, and distributed to sedimentation basins and filters. Lime and alum are added as water enters the plant; carbon dioxide, lime, and ammonia are supplied to the clearwell influent; lime and chlorine are added prior to draw-off.

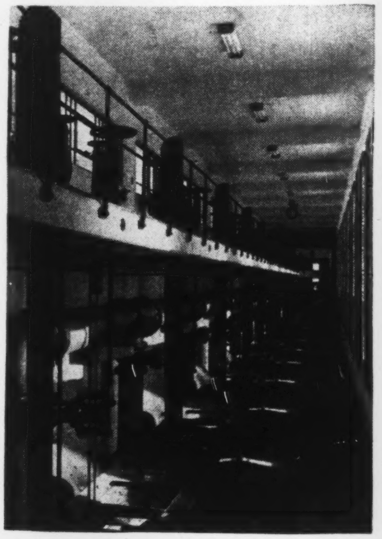


Fig. 3. In the filter galleries, operating devices are located along a balcony from which filters are observed. The lower corridor contains observation wells and sampling taps for each filter.

building; a concrete-arch bridge between buildings and supporting an access roadway; and a 100,000-gal. washwater tank.

Buildings are made of brick trimmed with precast-concrete copings and lintels; tanks and substructures are made of reinforced concrete. Full-height window recesses emphasize verticality in the tower and main building.

Drawn from the reservoir through 32-in. cement-lined steel pipe laid in a 2,100-ft. mountain-crossing tunnel, water enters a combined screening chamber and surge tank behind the plant. Discharge is regulated by means of two 18-in. sluice gates and two 18-in. float valves. From the screening chamber water drops through a 30-in. cement-lined, cast-iron penstock to two impulse wheels harnessed to generators that produce 320 kw. of electricity. This power is utilized in plant operation.

Tailrace discharge enters the treatment plant over a weir and is dosed with lime and sodium aluminate at rates of about 0.3 and 0.15 gr. per gal. respectively. After flowing partly around the power house in a contact flume and over the main weir, 1.3 to 1.6 gr. per gal. of alum are added. Baffled mixing then takes place in a channel which completes the circuit around the power house.

Water is then conditioned in a double row of three tanks each located between the power station and the main building. Generally, a single tank is operated, and one or both groups of these tanks may be by-passed by means of short-circuiting channels. In the conditioners stirring is accomplished by means of horizontal wings extending from vertical shafts. These shafts are actuated by variable speed electric motors through a train of reduction gears. Dog clutches permit the oper-

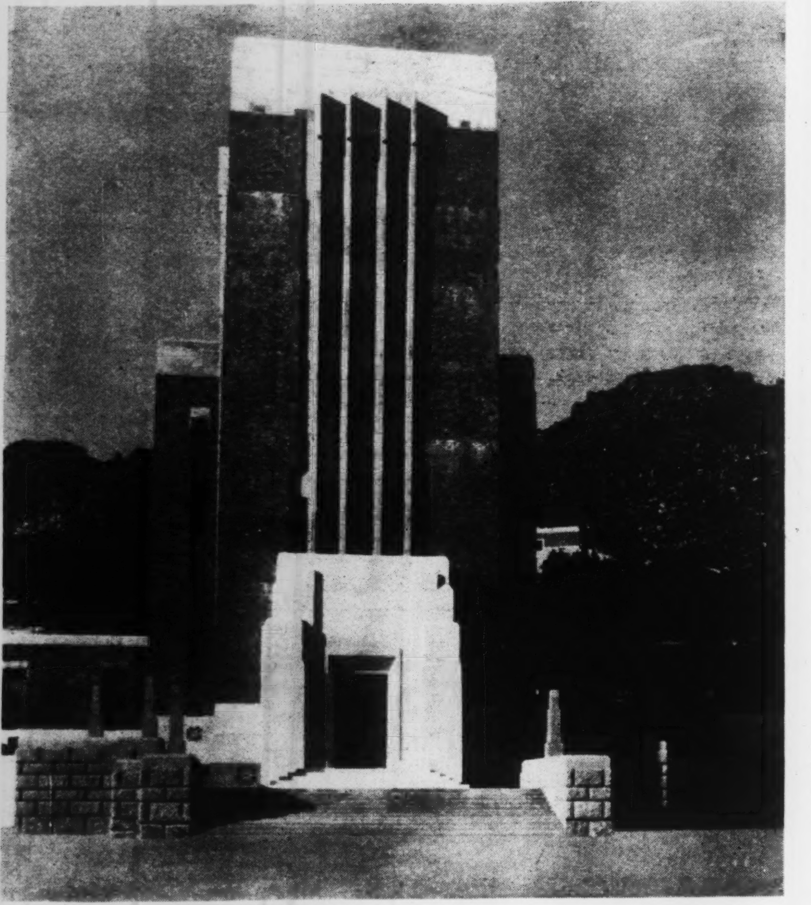


Fig. 4. An entrance tower which houses operating personnel dominates the Steenbras water filtration plant.

ator to utilize one or more sets of paddles. Reduction gears are immersed fully in oil and provisions have been made to preclude oil dripping into the tanks.

From the conditioners water enters sedimentation tanks through stilling chambers built with hopper bottoms for sludge removal. A battery of three sedimentation tanks extend outward from the centrally-located conditioners. Each sedimentation tank is 200 ft. long, 30 ft. wide, and 12 ft. deep. The detention period is 3.3 hr. at 20 mgd. and 2.7 hr. at 25 mgd. Each tank contains 60 sludge hoppers and is fitted with 20 6-in. sludge removal drains, each transversely located to serve three hoppers. Fitted with 6-in. valves, these drains discharge into the waste water channel. Tie beams spanning the tanks extend 2 in. below water surface to break up waves imparted by wind.

After leaving settling basins over three adjustable weirs, water passes along a launder to the filters.

Filters are located in front of the sedimentation tanks, ten filters to a bank and a bank on each side of the main building. Each unit is 35 ft. long and 15 ft. wide, and has a capacity of one mgd. at a rate of 80 gal. per sq.ft. per hr. (1.33 gpm.). This rate may be increased to 100 gal, to give a total discharge of 1.25 mgd. per filter. Filters are not covered but control and measuring devices are housed in a long, narrow operating gallery that also extend from the central structure and along the effluent end of each filter bank.

Water level alarms aid filtration

To facilitate operation, filter controls are mounted along balconies in the galleries (Fig. 3). Glass-covered effluent observation wells and glass-inclosed sampling taps are provided for each filter in the lower corridor. Four filters, two in each bank, are fitted with float-level alarms to assist in maintaining water level.

Filter beds are cleaned by wash-water delivered from a 100,000 gal. tank. A high-velocity wash is used to expand filtering material 50 percent without loss. This tank is situated on a nearby hillside providing a maximum head of 30-ft. Filtered water is supplied to this tank by means of 500 gpm. automatically-controlled, vertical-shaft centrifugal pumps.

From effluent channels filtered water flows to the center of the plant, over outlet weirs, and cascades to the lower level. At this point secondary lime and primary ammonia are applied. Mixing is accomplished in the turbulent fall.

After passing the carbonating bay where carbon dioxide gas is introduced under pressure through stainless steel tubes at the bottom of the bay, the flow enters a 1.25 mg. clear well. Here it follows a sinous course around baffles spaced about 45 ft. apart with adjacent openings on opposite sides of the tank. As treated water is drawn-off from the clear well and passes to a service reservoir, lime and chlorine are applied.

Chemicals are delivered to the second-story storage rooms by means of trucks. A specially-built roadway that passes over the power house and the arch bridge has been provided for this purpose.

Stored in bins 4-ft. in dia. chemicals drop through chutes to four dry-feed machines located on the first floor. Three units apply lime, alum and sodium aluminate and the fourth serves as a standby unit. Each machine has a range of 5 to 200 lb. (of hydrated lime) per hr.

Two sterilizers have a capacity of 0.5 to 5.0 lb. per hr. of chlorine. The carbonating unit can produce a total of 3,000 lb. of carbon dioxide gas in 24 hr. from coke.

The Steenbras filtration plant was designed by the Capetown's water department engineers. W. S. Lunn is city engineer and G. H. Lunt, water engineer. D. C. MacKellar was the resident engineer during construction. The plant was constructed by Christiani and Nielsen, New York, N. Y. and the equipment was furnished by the Paterson Engineering Co., Ltd., London, England.

High Capacity Piles on Chicago Hardpan

Harry Caudill
General Superintendent, Western Foundation Co., Chicago.

***Contents in Brief**—Composite steel pipe and concrete piles of projectile type of 60 ton load capacity and button-bottom type concrete piles of 40 ton load capacity carry a new General Motors building in Chicago. Driven into the hardpan that overlies bedrock, the piles showed a safe load capacity by formula of 145 and 120 tons respectively. Constructed by methods that eliminate side friction during driving, the piles compact the hardpan with the full force of the hammer ram. A special high-capacity, straight-line joint is a feature of the composite projectile type pile.*

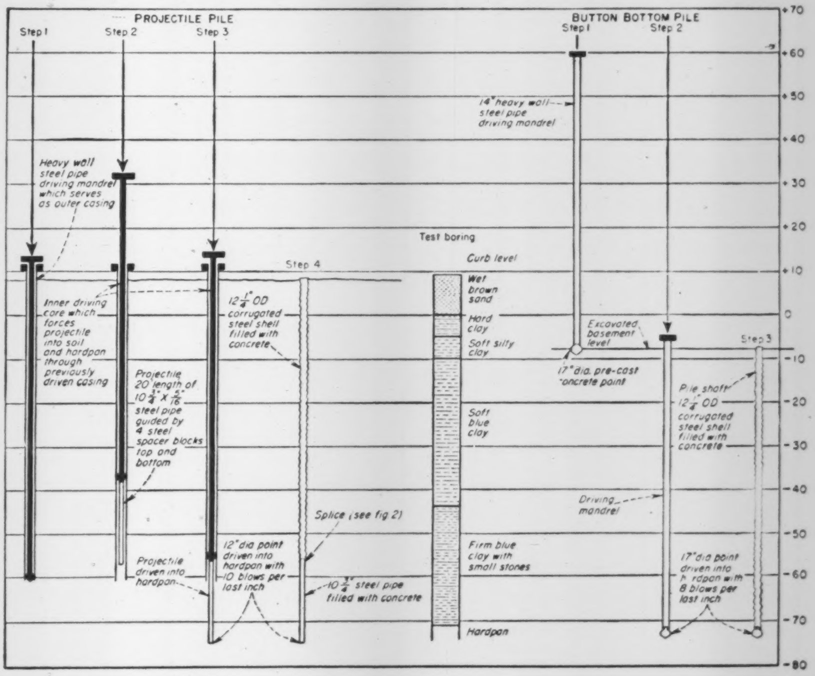
THE DISCUSSIONS of last winter in *ENR* (Dec. 12, 1946 vol. p. 779) regarding the permission to use 60 ton loads on composite steel pipe-concrete piles in Chicago when driven to hardpan, prompts the writer to submit information relating to a high-load-capacity piling job completed in Chicago during the early months of 1946. The work involved the driving of 351 "projectile-type" composite steel pipe-concrete piles of 60 tons capacity each and 350 "button-bottom type" concrete piles at 40 tons capacity each for the new Cadillac sales and service building of the General Motors Corp. Both types of piles were driven deep into the Chicago hardpan so that each transfers its full load to the compacted hardpan beneath the point. The projectile type piles were used within the unexcavated areas, and the button type piles were used within the basement areas of the building.

The piles were load tested to 120 and 80 tons, respectively, indicating a factor of safety of 2. As a matter of fact, the 20-ft. long steel pipe projectile sections of the composite piles were driven with a 7,500-lb. ram, falling 39 in., to a resistance of 10 blows through the last inch, indicating a safe load capacity of 145 tons computed by the modified *Engineering News* pile formula. Also, since the 70-ft. follower driving core was free of soil friction, the full energy of the heavy ram was effective in penetrating and compacting the hardpan over the rock, assuring that the maximum load carrying value was obtained.

The 17-in. dia. precast concrete point of the button-bottom pile was driven with a 14-in. dia. hollow steel mandrel. The combined soil pressure under the 17-in. point and the friction along the uniform diameter cylindrical mandrel reached a maximum through the last inch of penetration in the hardpan equivalent to 8 blows of the 7,500-lb. ram falling 39 in. Here, also, the full energy of the ram was effective in compacting the hardpan under the point since the hole made by the 17-in. point temporarily eliminated side friction on the driving mandrel. The driving resistance indicated a safe load by the modified *Engineering News* formula of 120 tons.

Although the tests indicated a higher capacity for the projectile type piles the design was based upon 40 tons for both types. This was done for uniformity, on account of the difference in lengths, and the elastic shortening of each length.

The borings on the site showed the top of the hardpan to be at about El. — 72, with 25 ft of "firm blue clay with small stones" overlying the hardpan. A "soft blue clay" bed extended from El. — 45 to — 10, while above the soft clay were layers of wet sand and silt through which the pile "ran" under the weight of the hammer. The upper surface of


PROJECTILE PILE
Step 1
Step 2
Step 3
Step 4
Heavy wall steel pipe driving mandrel which serves as outer casing
Inner driving core which forces projectile into soil and hardpan through previously driven casing
Projectile 20' length of $10\frac{3}{4}" \times \frac{5}{16}"$ steel pipe guided by 4 steel spacer blocks top and bottom
Projectile driven into hardpan
$12\frac{1}{4}"$ OD corrugated steel shell filled with concrete
12" dia point driven into hardpan with 10 blows per last inch
Splice (see fig 2)
$10\frac{3}{4}"$ steel pipe filled with concrete
Test boring
Curb level
Wet brown sand
Hard clay
Soft silty clay
Soft blue clay
Firm blue clay with small stones
Hardpan
BUTTON BOTTOM PILE
Step 1
Step 2
Step 3
14" heavy wall steel pipe driving mandrel
Excavated basement level
17" dia. pre-cast concrete point
Pile shaft $12\frac{1}{4}"$ OD corrugated steel shell filled with concrete
Driving mandrel
17" dia point driven into hardpan with 8 blows per last inch
+70
+60
+50
+40
+30
+20
+10
0
-10
-20
-30
-40
-50
-60
-70
-80

Details and construction procedures for the composite projectile type piles and the concrete button-bottom piles driven into Chicago's hardpan to support a new General Motors building.

the hardpan was found to be uniformly level and sharply defined over the entire site, as shown by the relative lengths and driving resistance of the piles.

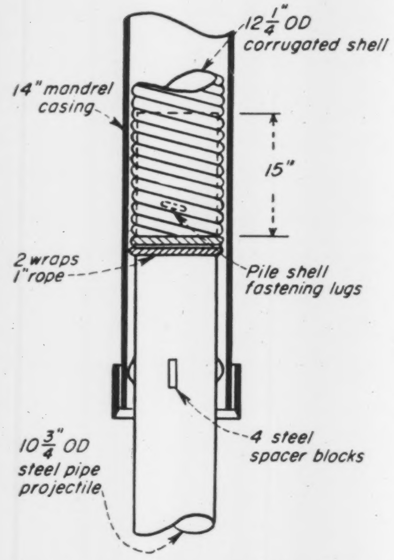
Projectile type composite piles

The equipment used in driving the projectile type composite pile may be likened to a 14-in. gun with a 72-ft. barrel buried vertically in the ground, hence the name. The steel projectile section, or pipe pile, was guided and hammered straight down from the end of the barrel to hardpan or rock. In effect, the pipe piles were driven from a level 68 ft. below ground surface, consequently they reached a maximum penetration in the hardpan.

The projectile type of driving equipment used to form the composite pile employed a duplex, heavy wall, steel pipe driving mandrel 72 ft. long. It consisted of an outer casing 14-in. in dia. and open at both ends and an inner core 12 in. in dia. and solidly closed at its lower end with a cast steel block fitting snuggly the inside the outer casing. A coned projection on the end of the core assured the centering of the core on the pipe section.

With the core inside the outer casing, the two were driven 68 ft. into the plastic Chicago clays in about 6 min. driving time. The casing was then left in place, similar to a gun barrel, the core withdrawn, and the 20 ft. long projectile pipe dropped into the empty casing. Top and bottom spacer lugs fit the casing to guide the projectile straight along the axis of the barrel.

The projectile pipe of seamless type was 10¾ in. outside dia., with a 5/16 in. wall. A 12-in. dia. ¾-in. thick steel plate was welded to the lower end of the pipe to serve as a driving point and bearing plate on the compacted hardpan. Using the driving core as a follower, the projectile pipe was driven to refusal, and in a straight line with the concrete top section. The driving of the projectile pipe through the "firm blue clay with small stones" and 3 to 4 ft. into the hardpan to a resistance of 10 blows for the last inch required about 9 min. time.



Joint used between sections of composite projectile type pile was developed to provide ample strength, concentric alignment and a mud-tight casing.

Prior to the insertion of the projectile pipe in the previously driven casing, two wraps of 1-in. rope were securely fastened around its top, thus filling the inside of the casing snugly. This rope grommet remained on the end of the projectile pipe, sealing the joint between the projectile pipe and the casing against entrance of plastic clay. It also provided a mud-tight seat for the corrugated pile shell, 65 ft. long, which was next pushed down over the end of the projectile pipe a distance of 15 in. and securely locked in place on lugs welded to the projectile pipe. In this way, the strength and concentric alignment of the top concrete section with the lower pipe section was insured, and no earth, sand or mud could mix with the concrete filling to weaken the pile shaft at this vital connection. The splice between the lower steel pipe section and the concrete upper section of the composite pile came within the "firm blue clay".

The driving resistance of the 20 ft. long pipe increased gradually through the "firm blue clay" to about 20 blows per ft. above the hardpan. This resistance rapidly increased as the 12-in. point penetrated the hardpan to about 75 blows per ft for the second last foot and 100 blows for the last foot. The last inch required 10 blows.

A projectile pile with its 12 in diameter flat-plate point, driven to 10 blows for the last inch with a 7,500-lb. ram hammer was test loaded to 120 tons, i.e. 153 tons per sq. ft., on the compacted hardpan. The load came to substantial rest in 2 hr. At the end of 24 hr. the total deflection was almost equal to the computed elastic shortening of the pile shaft, or 0.74 in. Immediately upon release of the load, more than half of the elastic shortening was recovered, the remainder being held in the shaft by the downward drag of the soil as the pile shaft re-expanded upward. The net settlement, after deducting the immediate rebound, was only 0.0033 in. per ton of test load.

Button-bottom concrete piles

For the button-bottom piles used on the job, precast concrete points 17 in. in dia. were driven 66 ft. into the ground on the end of a 14-in. hollow casing mandrel, and within this casing a 12¼-in. corrugated concrete pile shaft was constructed. Driving was carried on from the level of the basement, and the piles penetrated from 1 to 2 ft. into the hardpan.

The 17-in. precast concrete points used on the piles were tested under the direction and supervision of the building department of Chicago. When driven into the hardpan, they had a holding down value somewhere between the strength of a ¾-in. steel cable, which broke, and a 1-in. cable, by means of which one point was pulled up 3 ft. before the cable broke. This holding down value, which resists the uplift of the pile during the driving of adjacent piles, was, therefore, about 30 to 40 tons. After the corrugated steel pile shell was lowered into the casing and locked in place on the button-bottom point, a pull was exerted on the top end until the four strands of No. 9 wire, of which the lowering bail was formed, broke.

The breaking or crushing strength of the precast concrete point was tested under the driving blows of a 5,000-lb. ram. One point was driven into a 24-in. steel pipe filled with sand without a sign of fracture. However, the sand pushed up around the point at 6 to 8 blows per in. penetration, and the test was repeated after the 3 in. annular space between the side of the point and the pipe had been packed with coils of rope to hold down the sand filling. The driving resistance then increased to 20 blows per in. of penetration without damage to the button-bottom point. Next, the conical tip of a point was set in a 6-ft. square block of 3,000-lb. concrete. When the concrete block had hardened, the precast point was hammered with a 5,000-lb. ram, falling 36 in., for more than 5 min. at 50 blows per minute, with no damage to the precast point and no penetration of the block.

Four button-bottom piles driven to different amounts of final resistance in the hardpan were also load tested. The results indicate that the safe load supporting capacity of these piles, resting on compacted hardpan, was more than that necessary to meet the Chicago building code requirements. One pile driven to a final resistance of 5 blows for the last inch with a 7,500-lb. ram falling 39 in. and test loaded with 80 tons, developed a net settlement, after deducting the immediate rebound, of only 0.008 in. per ton of test load. Another driven to 6 blows per last inch with the same hammer developed a net settlement of only 0.002 in. per ton. The 80-ton test load produced a pressure on the compacted hardpan under the point of 51 tons per sq. ft. The computed elastic shortening of the pile shaft was 0.4 in., which checked closely the actual shortening under the test load.

The top 40 ft. of "soft blue clay" heaved about 6 in. over the site, but level readings taken systematically during the driving of the piles showed no upward movement of the finished, firmly anchored, piles. Test wires attached to the button-bottom pile points showed that the points were not lifted by the heaving of the upper clays. A slight lifting of the top ends of the pile shells proved to be due to the stretching of the corrugated pile casings.

A 3,000 psi., or better, concrete was used for filling the projectile piles and for the shaft of the button-bottom piles.

Designers and constructors

The Cadillac building was designed and constructed by Ragnar Benson, Inc., Chicago for whom Victor L. Charn is architect. J. Kenny Johnson of Chicago was consulting engineer. The pile foundation was constructed by the Western Foundation Co., Chicago, which holds patents on the projectile and button-bottom type piles.

Hydraulic Model Studies of Unusual Projects

Some unusual hydro-electric problems are being studied with small-scale models at the hydraulic laboratory in Grenoble, France where, during the war, tests were run on a model of the Rhine River at the request of the U. S. Army to measure what effect might be expected on American temporary bridges if the Germans blew up the upper-Rhine dams.

Engineers of "Electricite de France", the nationlized French electricity system, have submitted proposals to build a 2700-ft. long dam, 110 ft. high, across the estuary of the Rance River. This dam would use tidal variations as a source of power, as was proposed at Passmaquoddy in Maine.

The Rance estuary is near the famous Mont St. Michel, where unusually high tidal movements are caused by the structure of the Cherbourg peninsula. At the mouth of the Rance tidal variations reach 45 ft. Another factor cited in favor of the project is the flatness of the Rance's channel. Power yield, from eighteen 20,000-kw. turbines, might run between 700 million and one billion kwh. a year.

This project is first being thoroughly tested at the Grenoble laboratory, where an accurate scale-model of the lower Rance, its estuary, and the surrounding sea has recently been completed. This model will enable determination of the best emplacement and structure for the dam. At the same time the laboratory's facilities for testing cavitation in Francis, Pelton, Kaplan, and propeller type turbines will be used to check corrosion-resistance and shape of the new turbines required. Efforts are being made to develop a model which can function as both turbine and pump.

Another project of the Grenoble laboratory, undertaken for private Morroccan interests, involves the effort to harness the energy not of tides but of the up-and-down movement of ocean waves. Over 620 different ideas for accomplishing this feat have been canvassed. A model currently being studied consists of a rectangular concrete tank, whose forward side would sit just off-shore in position to receive the beat of the waves. This forward edge consists of a series of convex concrete dihedrons which narrow to slits at their inner extremities. Each slit in turn is covered by a pair of rubber clappers.

The force of waves hitting the convex edges of these dihedrons pushes the water, by the time it reaches the inner slits, to a level much higher than the wave level. This water then enters the tank through the rubber clappers, which hold it in the tank, so that the water level in the tank is much higher than the level of the sea outside. This higher water level can be used to drive a turbine placed beside the tank, and then fed back into the sea.

In the laboratory, also, a wave machine allows testing the apparatus under true-to-life conditions. Chief advantages cited for this apparatus are its simplicity and avoidance of metal parts in contact with the sea water.

Numerous other hydraulic problems have been studied by the same laboratory, including planning of river and harbor improvements and irrigation canals. One of the most successful experiments involved slowing the current of the Rhone River as an aid in building the cofferdams for the construction of the great power dam at Genissiat. Small tetrahedrons of steel angles anchored at the position of the cofferdam so reduced the current that stones thrown into the river upstream settled to the bottom at the proper alignment. Others were caught and held by the tetrahedrons.

The Grenoble laboratory is operated by Ateliers Neyret-Beylier et Piccard-Pictet ("Neyrpic"), manufacturers of turbines and similar heavy electrical equipment. Neyrpic's Grenoble plant employs about 1,000 people, while the laboratory employs 200 additional.

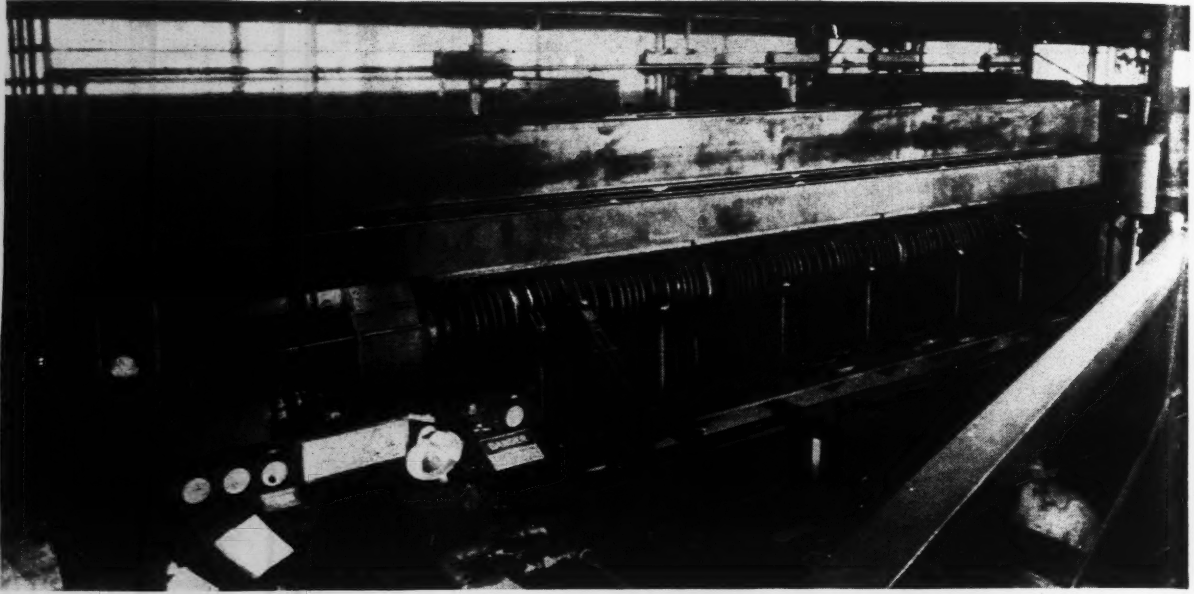


Fig. 1. This machine is used in the process of fabricating pipe by expanding it hydraulically against a machined die.

Expanding Pipe Beyond Yield Point To Make it Rounder and Stronger

***Contents in Brief**—Steel pipe for the natural gas line from El Paso to Los Angeles is hydraulically expanded with the diameter increasing from $29\frac{1}{2}$ in. to 30 in. Additional strength results due to cold working the steel. Uniform roundness and true alignment is assured because the die against which the pipe is expanded has been accurately machined.*

STEEL PIPE expanded under hydraulic pressure for added strength and perfect roundness is being used on the western portion of the line being built to bring natural gas from Texas to California. This pipe, manufactured by the Consolidated Steel Co. with equipment recently installed in its Maywood, Calif., plant, is 30 in. in diameter and has a minimum yield point of 52,000 psi. after the expansion process.

Although used in this instance for a natural-gas installation, it is understood that pipe so made is also usable for water or oil service. Because of the cost of the fabricating equipment, such pipe is considered economical only where long pipelines for relatively high pressure duty are to be installed.

Plates of special manganese steel approximately 92 in. by 30 ft. are used to make the pipe. Thickness varies from $\frac{9}{32}$ to $\frac{7}{16}$ in. depending on location in the line. Maximum pressure will be about 800 psi.

Special equipment prepares the pipe

A series of processes using special equipment in steps is used to remove waves or buckles, to trim the ends, to remove mill scale from the edges to be welded, to reduce the plates to exact width and squareness, to roll the edges and to roll the plate to a cylindrical shape. The cylinders are then fed through seam welders which use the submerged arc process. The resulting pipe as it is ready for the expansion process is about 30 ft. long and has an outside diameter of $29\frac{1}{2}$ in.

The first step in expanding the pipe is to bell the ends from $29\frac{1}{2}$ in. o.d. to 30 in. o.d. on a gradual taper starting 7 in. from each end. This is necessary because if the ends were not first so belled, they would not be enlarged to size during the hydraulic expansion of the pipe because of friction and lateral pressure against the ends.

The 30-ft. lengths are then placed in the hydraulic expanding machine and movable heads are placed over each end. Gaskets seal the ends and the pipe is filled with water through the movable heads until all air is removed. Pressure is increased until an internal pressure range of 1,200 psi. to 1,800 psi. is reached which is sufficient to expand the pipe.

The die against which the pipe is expanded has been accurately machined to correct alignment and a uniform 30-in. diameter. In the expansion operation, the pipe length shortens some $2\frac{5}{8}$ in. and the wall thickness is decreased about .003 in. while the outside diameter is increased $\frac{1}{2}$ in.

This procedure performs the functions of testing the weld to the yield strength of the plate material, sizing and straightening the pipe, and cold working it. An increase in the yield strength of some 25 percent results from cold working the steel. By so doing the strength is increased from a range of 42,000 to 47,000 psi. to one of 52,000 to 65,000 psi.

After the pipe section is expanded, the die is removed and the weld is hammer tested. The pipe is then taken to a machine which squares its ends and properly bevels them for welding. Two 30-ft. sections are welded together to form a 60-ft. shipping section. Before shipping to the job, the pipe sections are sandblasted, coated with a primer, coated with coal-tar, and wrapped with asbestos felt. Defects in the pipe wrapping are noted and marked for later hand repair by use of a high-voltage detector.

Construction started in February and the finished line will be capable of bringing 305,000,000 cu. ft. of gas a day to the southern California industrial area. Companies cooperating on the project are the El Paso Natural Gas Co., the Southern California Gas Co., and the Southern Counties Gas Co. The first named is building the portion from El Paso through New Mexico and Arizona to the Colorado River. The latter two are building the 214 miles of line from the Colorado River near Blythe, Calif., to the terminus of the pipeline at Santa Fe Springs in the Los Angeles metropolitan area. This portion of the line will be made of 30-in. diameter pipe and the remainder of the 1,200-mile line will be 26-in. diameter. Because the line will be the largest diameter high-pressure transmission line yet constructed, it is familiarly known as the "biggest inch."

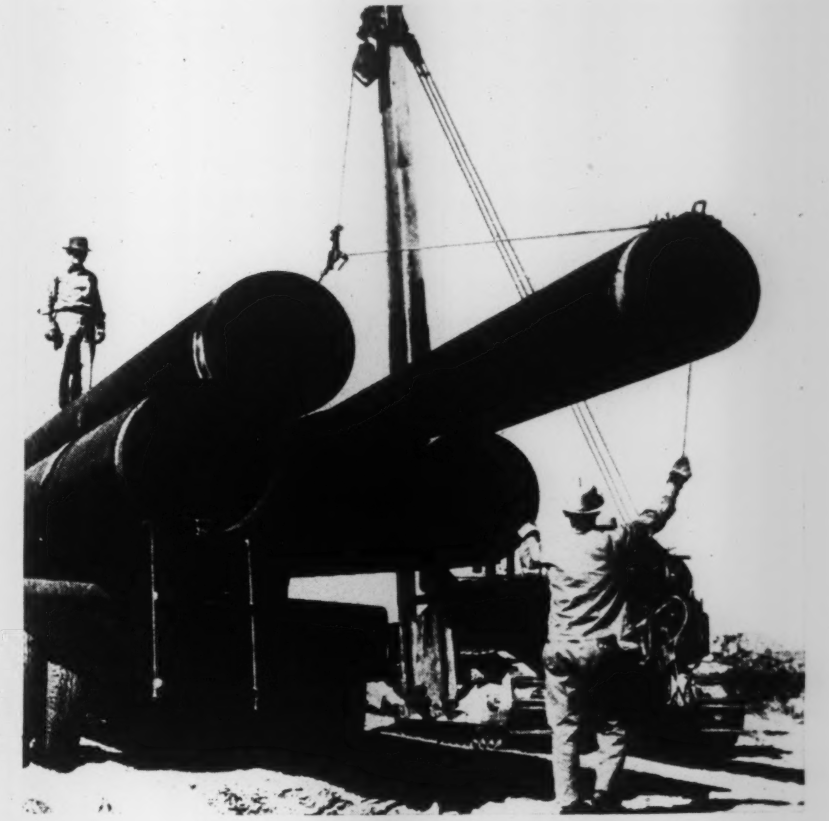


Fig. 2. Unloading 60-ft. lengths of the completed pipe as it arrives at the job.

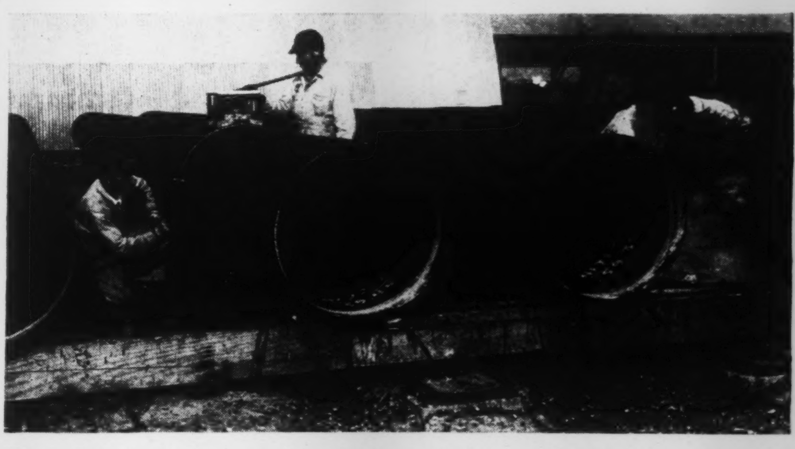


Fig. 3. Defects in the wrapping of the steel pipe are detected by means of a high-voltage detector.

Construction methods routine

In general, field construction methods follow standard procedures. Some preliminary grading is necessary to make the site of the line wide enough to accommodate the trenching machine and still leave room for other construction equipment to operate. The pipe will be placed in a trench 5 ft. in depth which will provide a 2½-ft. covering. However, in cultivated sections, the line will be laid at depths of about 10 ft.

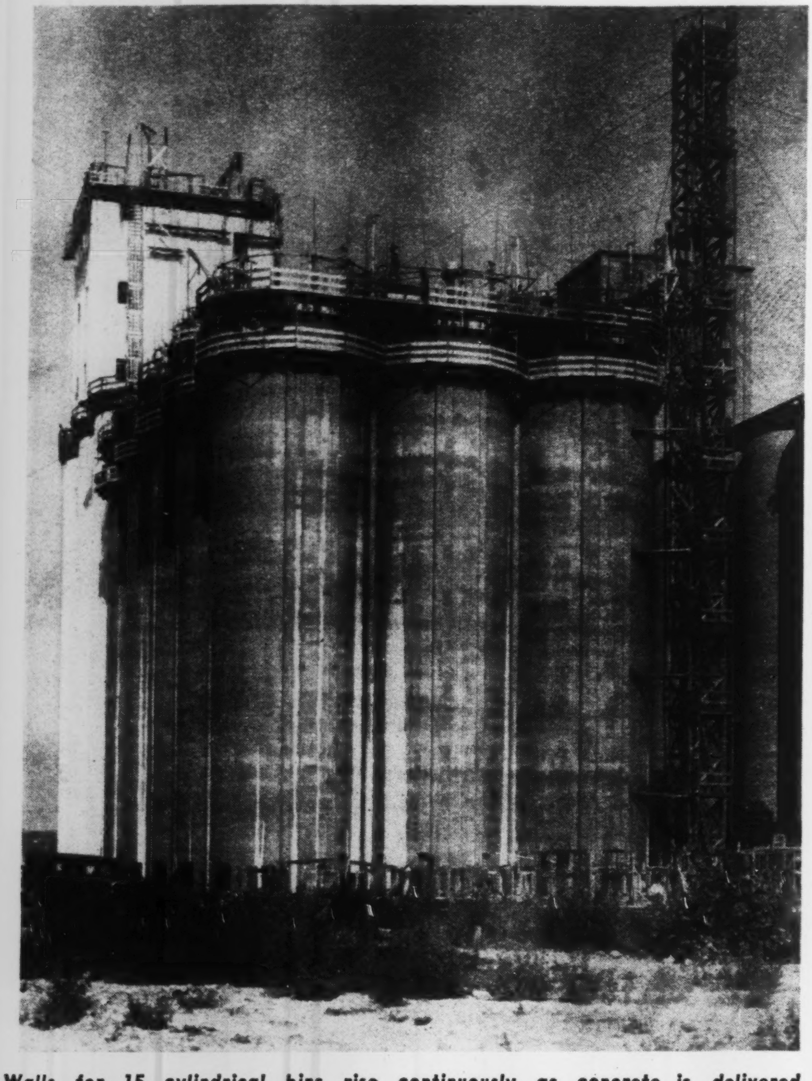
Joints made in the field will be welded by means of the shielded arc electric welding process. To help assure welds of uniform quality, some 10 percent of the welds will be x-rayed. At least one weld per welder per day will be so tested in order to promote a uniform standard of high quality welding.

Some 60,000 tons of steel will be used in the 214 miles of pipe and the Maywood plant is expected to produce 9 miles of pipe per week or about one 30-ft. section every 4¼ min.

Contractor for installation of the western portion of the line is H. C. Price Co. of Los Angeles. B. M. Laulhere is manager of engineering services for Southern California Gas Co., on the work in California.

Improved Concreting Techniques Facilitate Grain Elevator Construction

Contents in Brief—*Air-entrained slag concrete gave highly satisfactory results in construction of a 2,000,000-bu. grain elevator by the slip-form method. The concrete was pre-mixed at a commercial plant and hauled 4 miles to the site in open-body dump trucks. Of 20,000 cu. yd. delivered to the job, about two-thirds was placed in slip-form walls 7 to 10 in. thick. The elevator includes a headhouse 204 ft. high and 64 storage bins 118 ft. in height, 40 of them cylindrical in shape. Water sprays hung beneath the slip forms were used for curing.*



Walls for 15 cylindrical bins rise continuously as concrete is delivered from the hoisting tower at the right, which also will serve similar forms for additional bins in the right foreground.

FOR THE FIRST TIME in its extensive slip-form experience, the Macdonald Engineering Co., designers and builders of a 2,000,000-bu. grain elevator at Toledo, Ohio, used air-entrained, dump-truck-delivered, slag concrete for slip-form construction. The concrete was hauled 4 miles to the site in open-body trucks from the mixing plant of a commercial supplier who furnished more than 20,000 cu. yd. of concrete to the job. Air-entrained concrete, because of its superior plasticity and workability, had been employed by the designer-builders on four similar slip-form jobs in recent years; the truck-hauled, slag-aggregate mix on the Toledo project gave results equal to those obtained with more conventional air-entrained concrete mixture on other projects.

The structure on which the slag-aggregate concrete was used is an exact duplicate of a similar elevator built on the same property for the National Biscuit Co. by the same engineer-constructors in 1930. In fact, the project is one of those rare instances in which the designers are able to make a second use of plans. This addition brings the total wheat storage capacity at this plant to 6,000,000 bu.

Layout of the present job is shown in Figs. 2 and 3. The main structure is 118 ft. high with the workhouse at one end for unloading, handling and transferring grain 204 ft. high. There are 38 cylindrical bins with inside diameters of 25 ft. 6 in., one bin of 23 ft. 6 in., and one of 32 ft. to fit the limitations of the plant site. Including the star-shaped intermediate bins inclosed by the circular silos, the total number of bins in this portion of the elevator is 64.

Slab designed for reversal of stress

Walls of the circular bins rest directly on the foundation slab. The angle of repose of grain stored in a bin and the friction of the wheat against the concrete put a vertical live load on the bin walls in addition to the structural weight. Thus, the foundation slab has to resist a concentrated live loading under the walls, as well as under interior columns that support the floors of the circular bins. In addition, in a group of bins, some will be filled or partially filled while others are empty. For these reasons, the foundation slab is designed for cantilever action, both within individual bins and between bins.

The structure is supported on a heavily reinforced concrete mat over a blue clay foundation that permits a designed bearing capacity of 5,000 lb. per sq. ft. Under the silos the mat is 2½ ft. thick; under the workhouse the thickness is 3 ft. and is heavily reinforced.

Designed for heavy loading

For space to accommodate conveyors under the bins, the basement has a ceiling height of 10½ ft. from the top of the foundation mat to the underside of the floor slab. This slab is designed for a live load of 3,500-4,500 psf. In most of the outer bins of the elevator, the slab is supported by four basement columns in each bin, and is 18 in. thick. The center row of bins each has twelve columns under the floor with a slab thickness of 9 in.

Reinforced concrete walls of the cylindrical bins are 8 in. thick with thickness increased to a minimum of 9 in. for the party wall portion between contiguous tanks. In the workhouse, also built with slip forms, the thickness of the reinforced-concrete walls and partitions varies from 7 to 10 in.

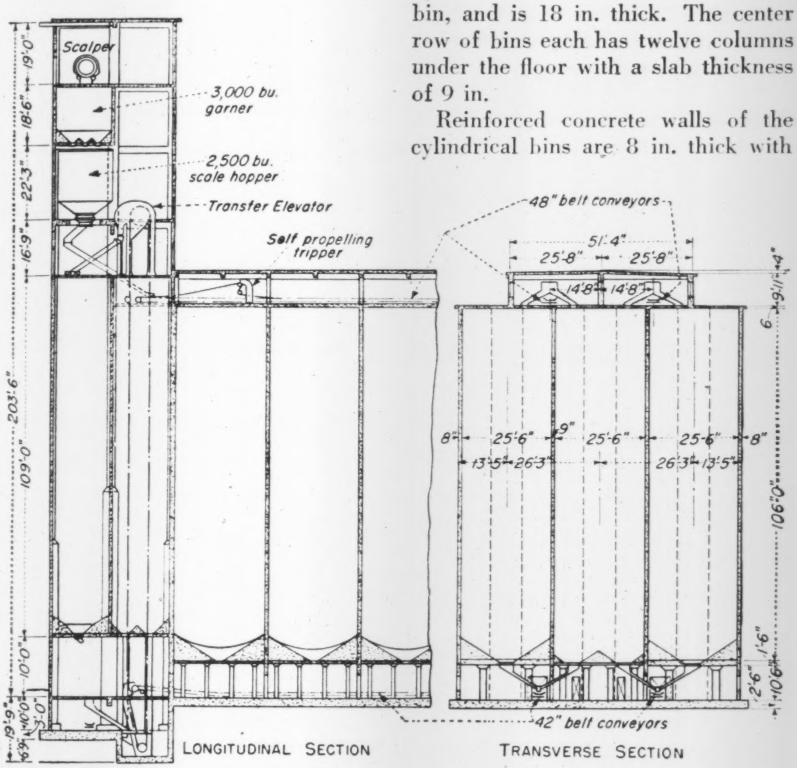
Over the bins, a slab of reinforced concrete 4 to 6 in. thick, is designed to take a 150 psf. live load of spilled grain in addition to supporting roof monitors, conveyors and motors.

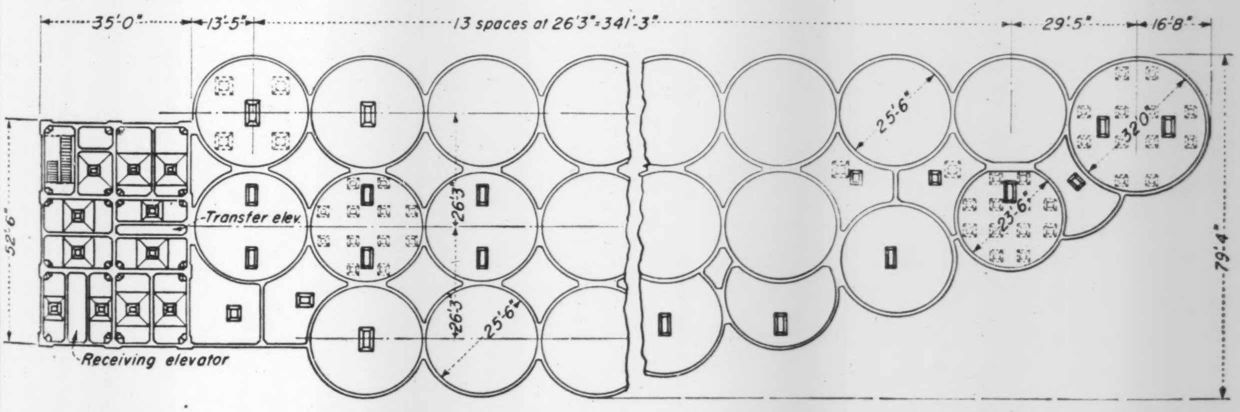
Slag-aggregate concrete

The slag-aggregate concrete was designed for 3,000 psi. strength at 28 days and for a slump of 5½-6½ in., or an average of 6 in. Proportions of the mix are shown in Table I. Six bags of cement per cubic yard were used, with a water-cement ratio of about 6.05 gal. per sack, giving a weight per cubic foot of 1.42 lb.; the weight reduction due to air entrainment was about 5.1 lb.

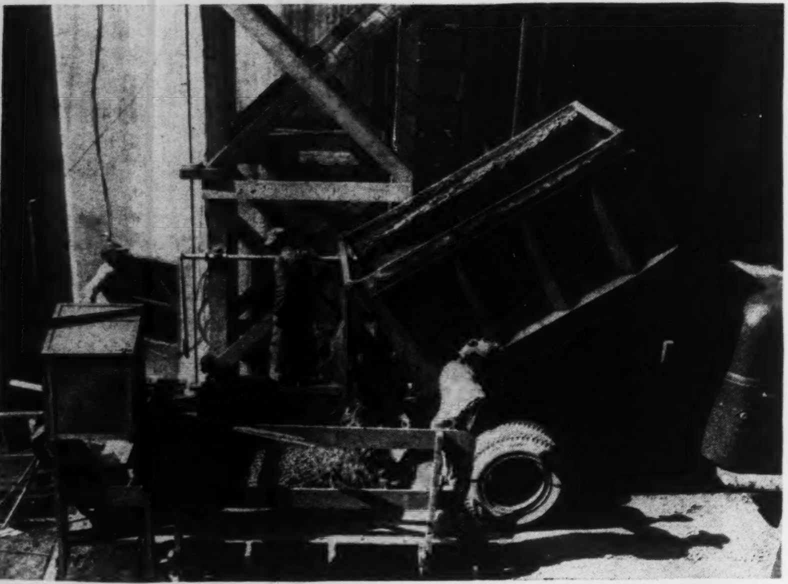
Concrete for the foundation mat and other substructure work contained 5½ sacks of air-entraining cement per cubic yard compared to 6 sacks used for the superstructure. Otherwise, the foundation concrete was similar to that for the superstructure.

Table 2 gives typical sieve analyses of the aggregates. Slag was the standard No. 4 gradation of the Ohio Department of Highways, a grade commonly used throughout the state. All the slag passed a 1-in. screen, and only a small percentage was retained on a ¾-in. screen. The fineness modulus of the slag was about 7.10. Dredged sand from Lake Erie was used as fine aggregate and had from

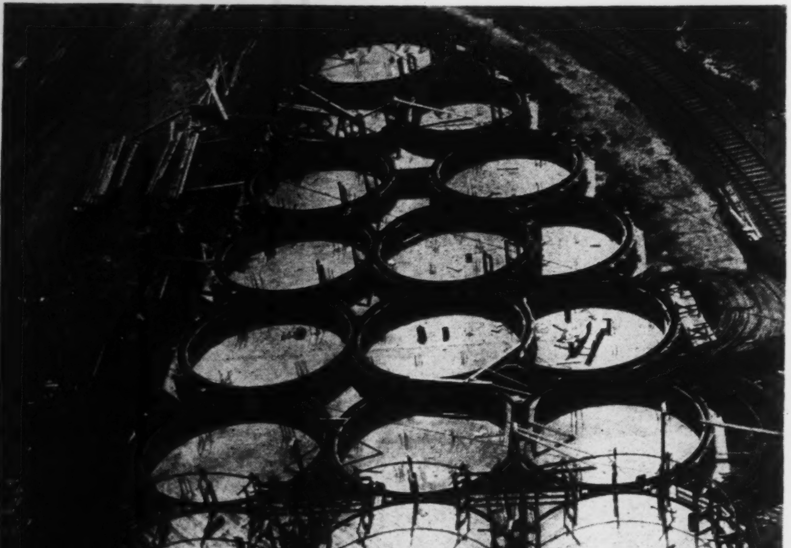

Scalper
3,000 bu. garner
2,500 bu. scale hopper
Transfer Elevator
Self propelling tripper
48" belt conveyors
51'-4"
25'-8"
25'-8"
14'8"
14'8"
9'-11"
4"
6
8"
25'-6"
9"
25'-6"
25'-6"
8"
13'-5"
26'-3"
26'-3"
13'-5"
106'-0"
1'-6"
2'-6"
10'-6"
42" belt conveyors
19'-0"
18'-6"
22'-3"
16'-9"
203'-6"
109'-0"
10'-0"
19'-9"
14'-0"
3'-0"
6'-9"
LONGITUDINAL SECTION
TRANSVERSE SECTION


35'-0"
13'-5"
13 spaces at 26'3"=341'-3"
29'-5"
16'-8"
52'-6"
79'-4"
Transfer elev.
Receiving elevator
26'-3"
26'-3"
25'-6"
25'-6"
32'-0"
23'-6"

A headhouse 204 ft. high and 40 cylindrical bins 118 ft. high are included in the new addition to the National Biscuit Co. plant at Toledo. Bin walls are 8 in. thick except at party walls.



Dump truck discharges 3-cu. yd. load of air-entrained slag concrete in 30 sec. into a hopper at the base of one tower. Pre-mixed concrete was hauled 4 miles to the job.



Slip forms for walls of sections 2 and 3 were erected on the foundation mat. The working deck has been installed for the bins in the foreground.

5 to 8 percent particles retained on a No. 4 screen. Fineness modulus averaged about 2.85.

Concrete was mixed in 3-cu. yd. batches at a commercial plant in a front-end-charging, 3 cu. yd. tilting mixer. The mixing time for each batch was 2 min. All the proportioning operations in this plant are automatically controlled, and the weights of all ingredients are automatically recorded on a continuous graph.

Test cylinders from each day's pour had an average compressive strength at 28 days of about 3,600 psi. with some specimens about 4,000 psi. ~~and~~ all above the minimum specified. Seven day strength averaged about 2,450 psi.

Concrete hauling equipment

For hauling 3-cu. yd. batches to the hoppers at the job, the concrete supplier used open, end-dump bodies of his own design. Rectangular on the outside, the body has inner rounded corners and a double bottom, rounded at the edges. For dumping into hoppers, the tailgate, which is hinged at the top, is swung open. To deliver concrete in controlled quantities, the tailgate has a funnel-shaped center outlet that is opened and closed by a hand-operated gate. A 6-ft. long chute, swinging through a 180-deg. arc, can be attached below this opening.

Concrete in the foundations near the bank was placed directly from the trucks through a truck-width chute that permitted full opening of the tailgate. With this arrangement, a truck could dump a 3-cu. yd. load in 30 seconds. Concrete that could not be reached by gravity delivery was transferred to 1-cu. yd. concrete buckets through the small gate and placed by crane, a much slower operation. Foundation concrete was placed continuously at average rates of 33 cu. yd. per hour, with as much as 1,000 cu. yd. going into a monolithic section.

Slip forms for continuous placing

On the completed floor slabs, slip forms were constructed in place. These were 4 ft. high for both inside and outside walls of each bin and were made up of ⅞-in. thick T&G yellow pine flooring set vertically and nailed to two wales. Each wale consisted of 2x12's in a horizontal position and cut to the shape of the bin with the ends lapped to make the wales continuous.

Inner and outer forms were suspended on jack frames attached to the wales at intervals of about 6½ ft. around the periphery of each bin. The frames were equipped, above the forms, with patented jacking units, pump-handle type, that could be secured to vertical 1-in. smooth round rods embedded in the concrete. A set screw and clamp firmly attached the jacking unit to the vertical rod. The fastening device was released when it was necessary to raise the jacking unit for a higher connection on the rod. The rods were extended as required by use of a short section of pipe sleeve crimped at the center to prevent slipping down the lower section of rod.

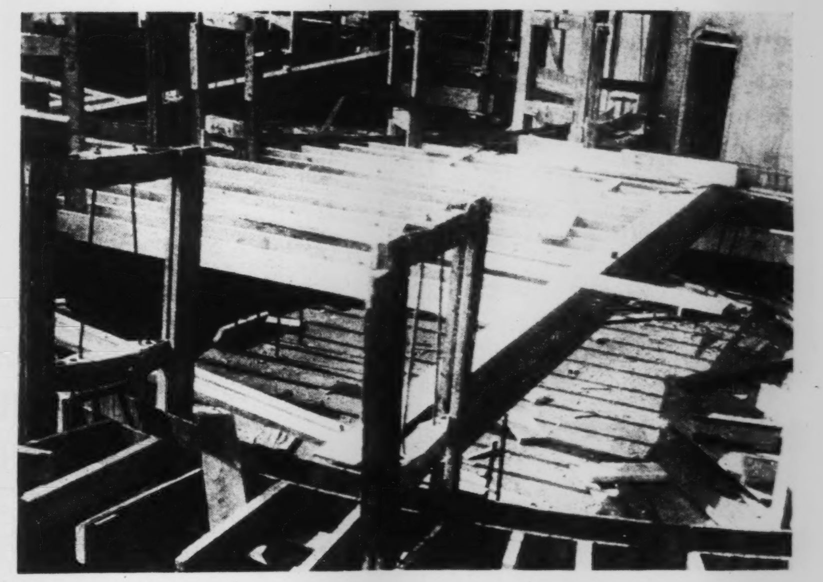
The platform deck, constructed to rise with the slip forms, was carried on wide-flanged steel beams designed to support the concrete slab roof of the bin. Steel angles welded to the main beams carry the deck joints. When raised to final position, the decking served as the bottom form for the bin top slab.

Form lumber required for the job was made largely from timber salvaged out of old mill-type buildings. Some 300,000 b.-ft. were cut to required size on job equipment that included a 54-in. circular saw with 60-hp. electric motor, a 24-in. planer with 20-hp. motor and a 14-in.-dia. table saw.

Built in three units

The superstructure of the grain elevator was divided, by 7-in. construction joints, into three units for continuous placing by slip-form construction. A tower bucket elevator served construction of the first unit, made up of the headhouse and eleven cylindrical bins. Another bucket elevator was erected alongside the structure at the junction of the second and third sections, to serve both. Concrete was delivered to the job 24 hours a day in quantities averaging up to 24 cu. yd. per hour. Six 3-cu. yd. dump trucks hauling from the mixing plant handled this demand.

At the job, the dump trucks backed up a ramp to discharge 3-cu. yd. batches into a 4-cu. yd. hopper at the base of the tower. Through a manually controlled gate, this hopper discharged into a 1½-cu. yd. tower bucket. Each tower elevator was operated by an electrically driven hoist, one of 75 and the other of 50 hp. About 15 ft. above the level of the constantly rising working deck on the slip forms, the tower bucket discharged through a hand-operated clamshell gate into a chute that delivered to a 1-cu. yd. floor hopper of conical shape. Pneumatic-tired concrete buggies were charged under the floor hopper, with concrete distributed by ten workmen who wheeled about 5-cu. ft. of concrete in the 6-cu. ft. carts.



Permanent steel beams to support the bin roofs were used to carry joists for the working deck that rose with the slip forms.

TABLE I—TYPICAL SIEVE ANALYSIS

Concrete Aggregates (Slag and Sand)

Sieve size	Percentage retained Coarse aggregate	Percentage retained Fine aggregate
1-in	*00	....
¼-in	16	....
½-in	*74	....
⅜-in	94	00
No. 4	99	08
No. 8	100	20
No. 16	....	33
No. 30	....	48
No. 50	....	73
No. 100	....	97
Fineness modulus	7.09	2.79

*Not included in fineness modulus determination.

TABLE II — TYPICAL MIX, SLAG-AGGREGATE CONCRETE FOR SLIP-FORM CONSTRUCTION

Cement	564 lb.
Sand	1,464 lb.
Slag	1,590 lb.
Total water (6.05 gal. per bag of cement)	393 lb.
Slump	6 in.
Strength	3,000 psi.

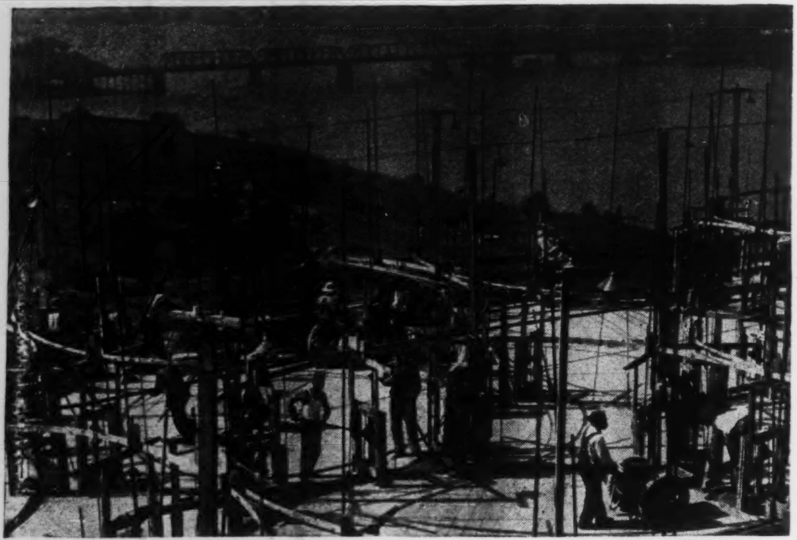
Concrete was spaded, rather than vibrated, to consolidate it around the reinforcing steel and eliminate any pockets or honeycomb. Vibration might have a tendency to disturb sections of the freshly placed concrete just below the sliding form, especially if a vertical bar had been struck by a vibrator.

Forms were kept at uniform elevation by checking vertical "story" poles, extending upward from the foundation slab. These were marked in feet and inches to indicate the exact height of the forms and the locations for changing the spacing of horizontal reinforcing bars or placing windows and inserts in the concrete walls.

Concrete in the bin walls was water-cured throughout the construction by nozzle sprays from a horizontal pipeline suspended below a finishers' scaffold just beneath the forms.

Average 17-ft. rise per day

Average rate of rise of the slip forms was 17 ft. every 24 hours. To place the 20 to 24 cu. yd. of concrete per hour required for this production, the contractor employed a crew on the working deck totaling 75 men: 35 distributing and placing concrete including wheelers, shovelers and spad-



High above Maumee River, wheel carts distribute concrete over working deck to slip forms, raised and kept level by operation of ratchet "pump" jacks on rods embedded in concrete.

ers; 18 on the jacks raising forms; 10 ironworkers setting and tying reinforcing steel; five laborers handling steel for the ironworkers, and four concrete finishers with three helpers working on a hanging scaffold below the slip forms.

On the 12-hr. day shift the total number of men employed on the job was about 125. This force included a crew of carpenters for building forms.

A considerable amount of equipment is installed in the completed structure, which is designed to handle 25,000 bu. of grain per hour, either receiving it or transferring it from bin to bin. Two bucket elevators are provided, one for receiving grain and one for transferring it. To deliver grain to the bins, two 48-in. belt conveyors are installed in the roof monitors, while under the bin in the basement, there are two 42-in. belt conveyors for reclaiming or transfer of grain. A bridge connects the headhouse of the new unit with the structure built in 1930 and separated from it by two railroad tracks.

Other air-entrained elevator jobs

On four similar projects since 1939, the Macdonald Engineering Co. successfully employed air-entraining cement for slip-form construction. For the concrete mixtures at all four jobs, the coarse aggregate used was crushed stone. Air-entraining cement incorporated in the mixtures for these various projects came from at least five different manufacturers. In every case, including the slag-concrete job at Toledo, the air-entraining agent was ground into the cement at the mill.

The grain elevator was designed and built for the National Biscuit Co. under the direction of James W. Macdonald, president, and N. B. Thomsen, vice president, of Macdonald Engineering Co., Chicago. Henry E. Christian, who was in charge of construction on the elevator built in 1930, was superintendent on this job also. Walter Benton was general foreman. The Robert W. Hunt Co., Chicago, was responsible for concrete control.

Bascule Bridge Leaves Relieved of Hidden Load

Faulty operation of three bascule bridges across the Lake Washington canal—a problem that has plagued the Seattle, Wash., engineering department—was solved recently by a thorough cleaning of the steel-mesh flooring, according to City Engineer C. L. Wartelle.

Shortly after installation of the steel-mesh flooring on the Ballard bridge in 1940, the city's engineers found that the overwater leaves, each 120 ft. long and 40 ft. wide, were growing steadily in weight. It became necessary to add counterweights several times to balance each leaf, not only on the Ballard bridge but also on the Fremont and University bridges. Frequent inspections were made, but for many months no surface indications of the cause could be found. The operating equipment was in good order, but the motors showed definite signs of overwork as the leaves increased in weight.

In each case, more and more concrete blocks had to be added for proper balance. At the University bridge alone, 128 additional counterweights of 150 lb. each were necessary.

The engineers finally learned that accumulation of dirt in the mesh and on the supporting channels and angles was causing the increase in leaf weight, but until recently, they were unable to remove the dirt because of a scarcity of labor.

Removal of the dirt was accomplished with blasts of water from fire hoses, followed by wire brushing and scraping. Much of the work was done from a bosun's chair suspended beneath the bridges.

Following completion of cleaning, 94 counterweights were removed from the north leaf of the University bridge and 110 from the south leaf of the Ballard bridge, with a consequent easing of the load on the bridge operating mechanisms. Engineers estimate that a total of 26,000 lbs. of dirt had collected on the Ballard bridge since 1940 and 27,400 lbs. on the University bridge since 1932 but accumulation on the lower Fremont bridge was considerably less.

As a result of this experience, the engineering department is studying the feasibility of installing a water line beneath each bridge, with faucets located at 10 ft. intervals for convenient use of a hose. Such an installation would permit an annual cleaning of the bridges during winter when the dirt is softened by rains and thus easily removed.

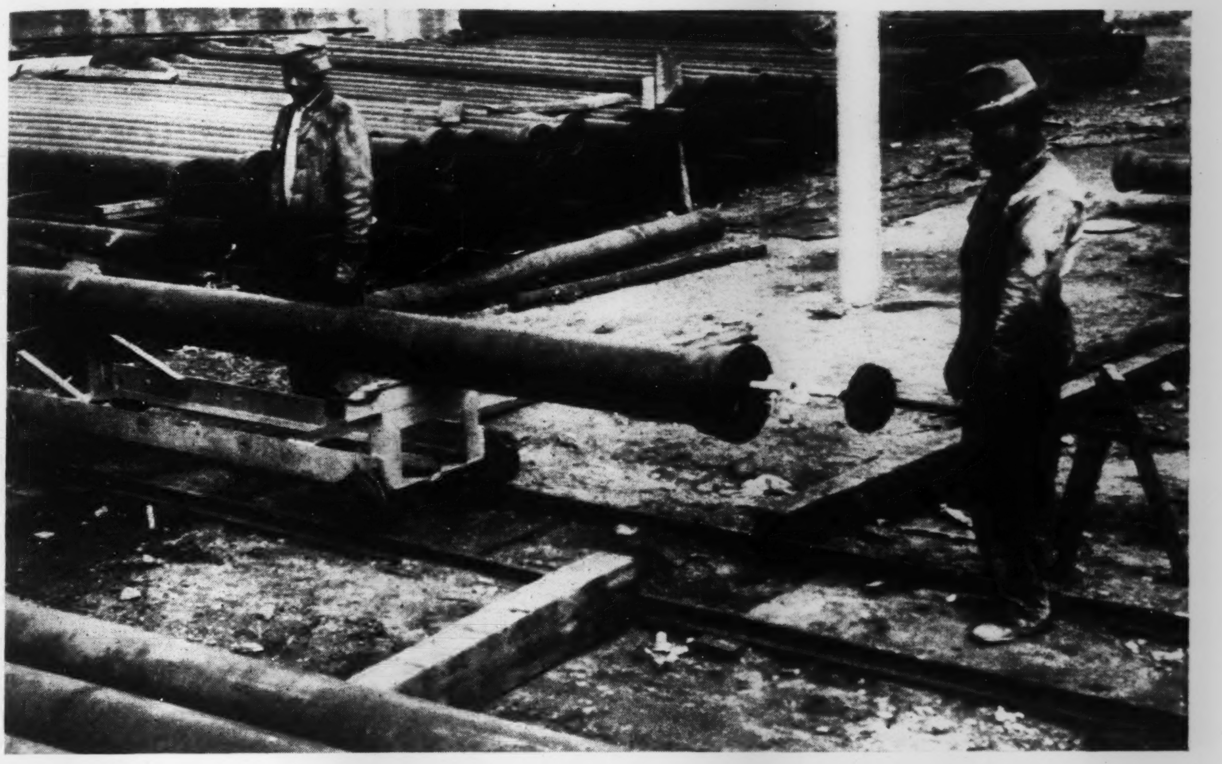


Fig. 1. A special auger is used to clean the pipe as it moves forward on a four-wheel, narrow-gage, hand car.

Cleaning and Lining Cast-Iron Pipe With Shop-Built Equipment

Contents in Brief—*To rehabilitate old cast-iron water pipe, the maintenance forces of the Atlanta water department thoroughly clean the pipe, which includes the use of a special cutting auger to remove tubercules, and then line the pipe with a ⅛-in. thickness of cement mortar. A carefully proportioned mortar with a slump of 9 in. is used and the pipe is spun at 800 rpm. with shop-built equipment while lining is added. This procedure permits an 8-man crew to line 20 sections of pipe in an 8-hr. day. The cost of the work is 25c. per lin. ft. for 8-in. dia. pipe.*

WATERWORKS ENGINEERS of the city of Atlanta, Ga., this year are salvaging 18,000-ft. of old, highly tuberculated cast-iron pipe by lining with a thin layer of cement mortar. A method has been perfected that makes the hydraulic flow characteristics of salvaged pipe equal to new pipe and is said to assure long life for the treated sections.

Initial trials with this method of salvaging pipe were made about eight years ago. Each year since then between 5,000 and 10,000 ft. of pipe have been rehabilitated and a low-cost technique has been developed. This year some 18,000 ft. of 8-in. cast iron main will be reclaimed. This pipe, which formerly served an industrial plant no longer in operation, is severely corroded internally.

As the first step in salvaging 12 and 18-ft. sections, the exterior surface is carefully cleaned of rust and foreign material. To expedite this operation a shovel cut to the shape of the pipe is used as shown in Fig. 2.

Auger cleans interior

The interior of the pipe is cleaned by means of a special auger (Fig. 1). This tool is equipped at the end with six chain hammers formed with hard welding rod and operates at 1,500 to 2,000 rpm. Directly behind the hammers an 8-in. dia. wheel equipped with wire brushes is provided, which assists in aligning the auger in the pipe. Farther back on the rod are two additional wire brushes; these are the same diameter as the first brush but differ in that they are provided with longer bristles. The latter two wheels may be shifted along the 1⅛-in. dia. axle as conditions require.

Power for driving the cleaning

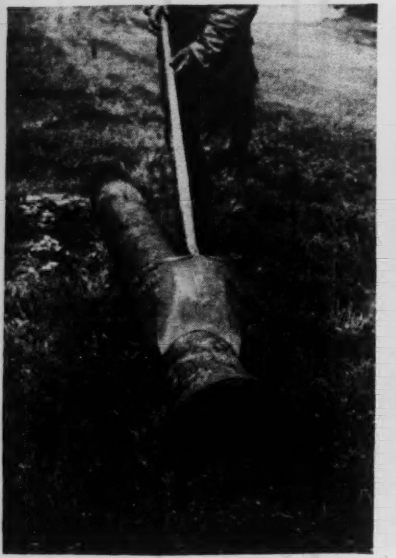


Fig. 2. Long-handled shovels with their blades specially cut to the shape of the pipe are used to scrape and clean the outside of the pipe.

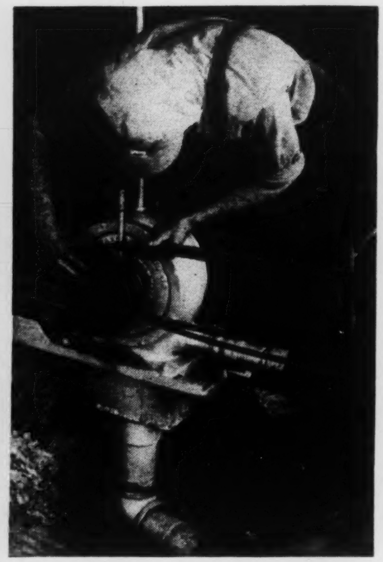


Fig. 3. Power for both the special cleaning auger and lining machine is supplied by this small multiple-belt-connected water turbine (5 hp.).

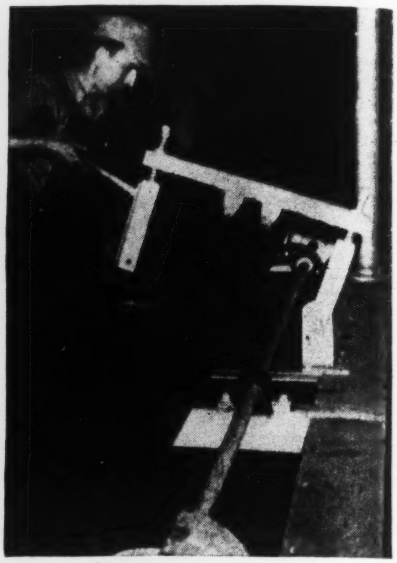


Fig. 4. To keep pipe from jumping off of the shop-built spinning machine, a clamp bearing lightly on the pipe is provided at the center of the machine.

auger is supplied by means of a 5-hp. water turbine (Fig. 3). This unit was selected because electric power was not available at the yard where the work is done when the first pipe was salvaged. Although electric power is now available, use of the turbine has continued because the water pressure can be more easily regulated to control the speed of the auger. Moreover, the turbine is used to spin the pipe at high speed while the lining is being added, and here accurate control of the speed is even more important. The drive shaft for the auger incorporates a small universal joint, which provides the required flexibility. The shaft is connected to the turbine by means of a V-belt drive.

Mechanical handling speeds work

In removing tuberculation from the inside of a pipe, the section is rolled by means of skids onto a small four-wheeled car that operates on steel rails. Cleaning of the pipe is advanced by pushing the car forward. Incidentally, the cleaning operation is started at the bell end. Although it has been found that some pipes in service less than ten years are badly clogged with tubercles, the pipe may be cleaned in a few minutes with the auger.

After being cleaned the pipe section is rolled off the opposite side of the car by skids to a temporary storage pile. From this point the section is transferred to the lining machine by means of an overhead hand-operated chain hoist that permits two men to readily handle an 18-ft. section of the pipe (Fig. 1).

Lining machine built in shop

The lining or spinning machine (Fig. 4) was built by the maintenance force of the water department. It is equipped with ball bearings and will accommodate pipe of 6, 8 and 10-in. dia. in 12 and 18-ft. lengths.

The spinning machine consists of four 12-in. dia. steel wheels mounted on parallel $1\frac{11}{16}$-in. axles, $13\frac{1}{4}$ in. on center. The parallel wheels opposite the driven end are adjustable to accommodate 12 and 18 ft. lengths of pipe. The wheels are set on 6 ft.-6 in. centers for 12 ft. lengths and 10 ft.-0 in. centers for 18 ft. lengths and are set so that the pipe rests on the bottom quarter segment.

Two of the spinning wheels and one shaft are directly connected to a variable speed water-motor (5 hp.) by means of a 6 ft.-6 in. by 5 in. canvas belt. The other two wheels are connected to the first shaft by sprocket gears with $\frac{3}{4}$ in. chain drive. Spinning wheels are provided with semicircular safety guards.

The entire unit is secured to a 9 in. I-beam assembly, 10 ft.-9 in. long and 3 ft.-7 in. wide. An adjustable stabilizing pulley, hinged at one end with a catch at the other, is located at the center of the pipe to insure a secure position and prevent lateral movement. This device is an important safety element and consists of two 4-in. dia. rubber-faced ball-bearing steel casters held in place at the top of the arc of the pipe by heavy tension springs.

Careful work is required

Experience has shown that, if a good lining is to result, the speed at which the pipe is spun must be regulated within narrow limits and the mix of the cement-sand mortar and its slump carefully controlled, a 9-in. slump being preferred. The amount of water in the mixture has proven so important that sand is dried thoroughly in an old gasoline-driven portable 1-yd. concrete mixer. Heat is supplied by a small kerosene weed burner mounted at the charging end of the mixer drum (Fig. 5). Also, white silica sand is carefully screened to remove all material not passing a No. 16 sieve.

A lining of about $\frac{1}{8}$-in. thickness has been proven best and the mortar is mixed in batches of the correct size for a specific number of pipe sections. It had also been found that addition of a small amount of slag cement (natural) improves the mix for lining, as use of this type of cement

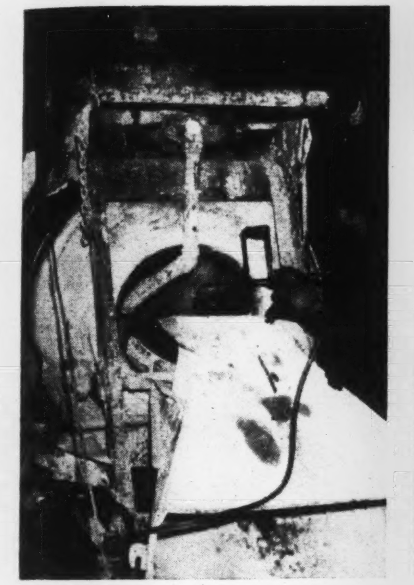


Fig. 5. To permit more accurate control of the water content and thus the slump of lining mortar, sand is dried just previous to mixing.

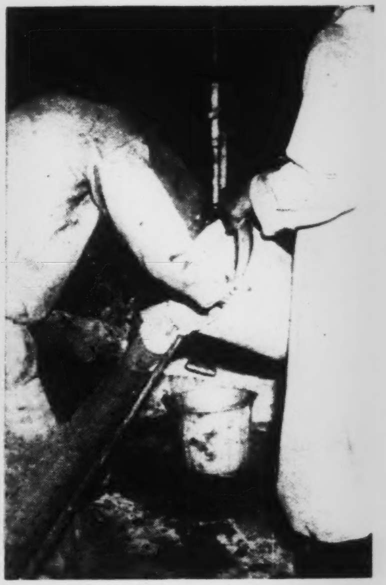


Fig. 6. Mortar is fed into the pipe by means of one-half of a 3-in. pipe. Once completely inside, it is rotated 180 deg. to distribute mortar uniformly.

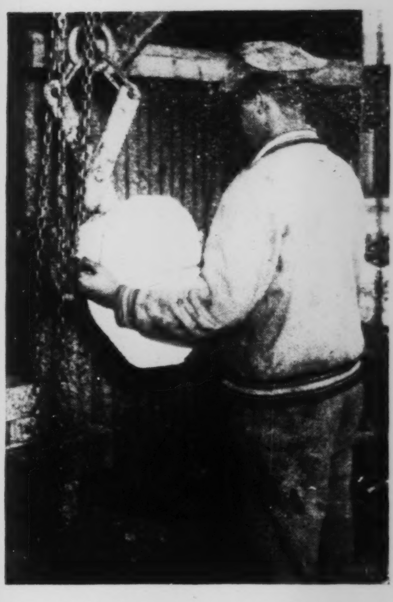


Fig. 7. During curing of the lining, both ends of the pipe are closed with a small piece of canvas held in place by means of a band cut from an old inner tube.

delays setting of mortar, prevents cracking, and insures a smoother surface.

The basic mix generally used is as follows:

Sand (dry wt.)	462 lb.
Porland cement	294 lb.
Slag cement (natural)	91 lb.
Water	152 lb.

The sand-cement mortar is prepared in a 500-lb. standard mixer. To transfer mortar to inside of the pipe the required amount (85 lb. per 8-in., 12-ft. section and 125 lb. per 8-in., 18-ft. length) for a single section is placed evenly along on a mandrel made up of a half section of 3-in. dia. pipe (Fig. 6). Then, while the pipe is being revolved at about 100 rpm., the mandrel, which is suspended from an overhead trolley rail, is inserted in the pipe and turned through 180 deg. to discharge the mortar. After the mortar begins to smooth out, the mandrel is withdrawn and the pipe is rotated for about 5 min. at the 800-rpm. This action produces a mirror-like finish.

Then the safety stabilizing pulley assembly is unlatched and the lined pipe tilted at the bell end in order to drain away excess water. A quart of clean water usually is flushed through the pipe while draining. This action cleans the lining and removes a small amount of surplus mortar.

To improve the quality of the lining, one quart of asphalt emulsion paint mixed at the rate of about one part of the liquid asphalt emulsion to one part of water, is added at either end of the pipe. This liquid is spread uniformly over the lining by revolving the pipe at 200 rpm. for about two minutes. Excess is drained out and each end of the pipe closed with a piece of light 18-oz. canvas held in place with a band cut from an old inner tube (Fig. 7). Then the pipe is rolled from the lining machine down timber skids to a curing rack.

The pipe is left undisturbed for two days on this rack with the ends closed. After this time, the outside of the pipe is surfaced with two coats of bituminous enamel paint. The improved pipe, which before cleaning might have had a Hazen-Williams coefficient of only 70, has a coefficient of 130.

A part-time job

Only a small crew is employed to carry out the work described. It usually consists of one foreman, six laborers, and the operator of the spinning machine. The men are members of the regular maintenance forces and they line pipe during times when "fill-in" work is needed. Since most of the equipment is under cover, work can be done on rainy days and at other times when outside work would be unpleasant. The 8-man crew can clean and line 20 sections of 8-in. dia. pipe in a single day.

It has been found in lining several thousand feet of 8-in. dia. pipe that the cost has been about 25c. per lin. ft. This cost includes cleaning, lining, and painting the outside with bituminous enamel, plus the cost of the materials and labor. It also includes a small amount for water required to drive the turbine furnishing necessary power.

A breakdown of the 25c. figure for the 8-in. pipe is as follows: Cleaning of pipe, 6c.; lining pipe, 19c. (labor, 11c.; equipment, 2c.; fuel, 2c.; materials, 3c.; and miscellaneous, 1c.). In view of the excellent results and good service obtained, Atlanta officials consider the method highly economical. During the past years, when many cities were finding it extremely difficult to obtain small diameter pipe, the city of Atlanta was able to meet many of its needs by rehabilitating used pipe.

Paul Weir, general manager of the Atlanta waterworks department, is in general charge of the work described. Detailed supervision of the operation is under the direction of Sherman Russell, water purification engineer and Howard Bullard and J. H. Vaughan, foremen.

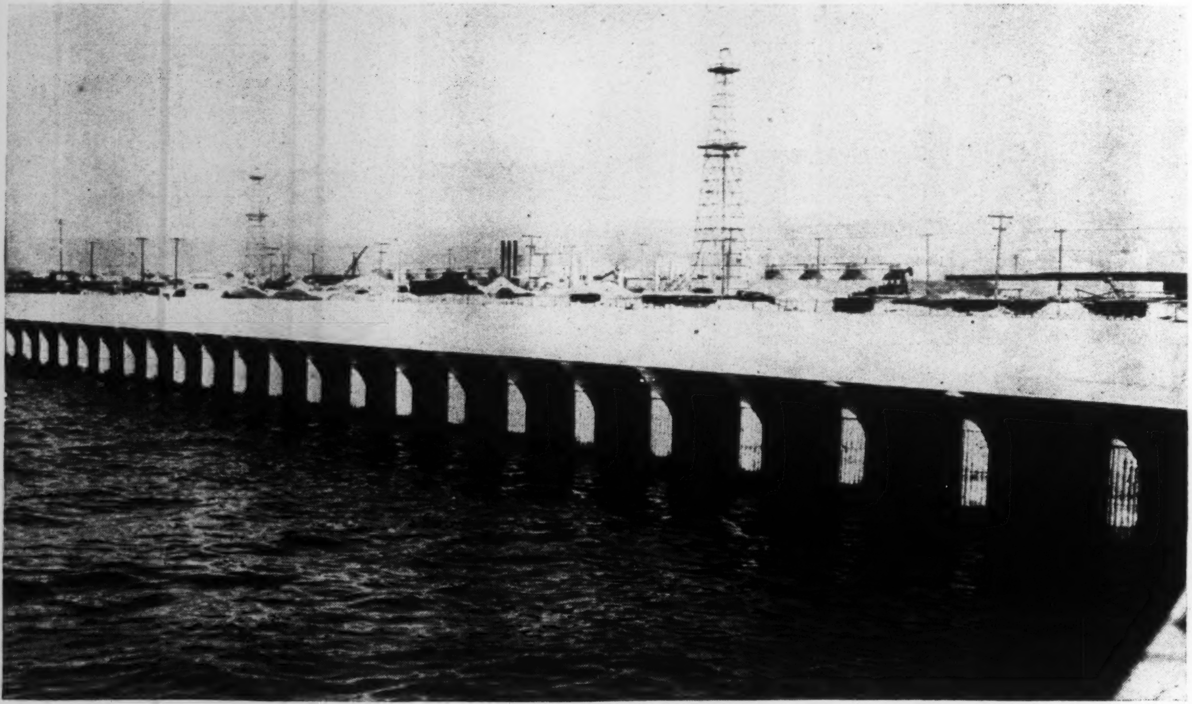


Fig. 1. The fluted steel pile construction of the wharf is here shown before installation of the bumper system.

Concrete-Filled Steel Piles Support Wharf at Long Beach, Calif.

R. R. Shoemaker
Chief Harbor Engineer
Port of Long Beach, Calif.

Contents in Brief—*The wharf deck for Pier A, recently constructed at the Port of Long Beach, Calif., is supported on some 1,000 composite piles the steel shells of which are exposed to the action of sea water. The load carrying capacity of these piles was carefully investigated as was the density of the concrete cast-in-place core. The pier is part of the facilities which help to make Long Beach one of the most modern ports in existence.*

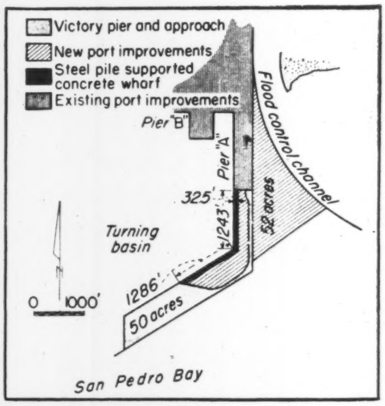

Victory pier and approach
New port improvements
Steel pile supported concrete wharf
Existing port improvements
Pier "B"
Pier "A"
Flood control channel
325'
1243'
52 acres
Turning basin
0
1000'
1286'
50 acres
San Pedro Bay

Fig. 2. Most of Pier A is made of filled material, but the section near the pierhead line is supported on concrete filled steel tubes. Victory Pier was built during the war.

THE use of concrete filled steel piles in sea water, believed to be an innovation in port construction, is one feature of the construction of a new pier for the Port of Long Beach, Calif. This pier is designed to provide ample space for cargo handling facilities and provide flexibility for future improvements in methods and equipment for such work. Before adopting concrete filled steel piles on this work, tests were made to insure their load carrying capacity and the denseness of concrete core material.

Most of the pier is rock and hydraulic fill. However, to provide 35 ft. depth at the pierhead line, a combination of sheetpile bulkhead and steel-pile-supported wharf was used. A portion of the Victory Pier was built during the war by the Corps of Engineers for munitions loading (*ENR* Feb. 21, 1946, vol. p. 282). The rest of the pier was built in 1945

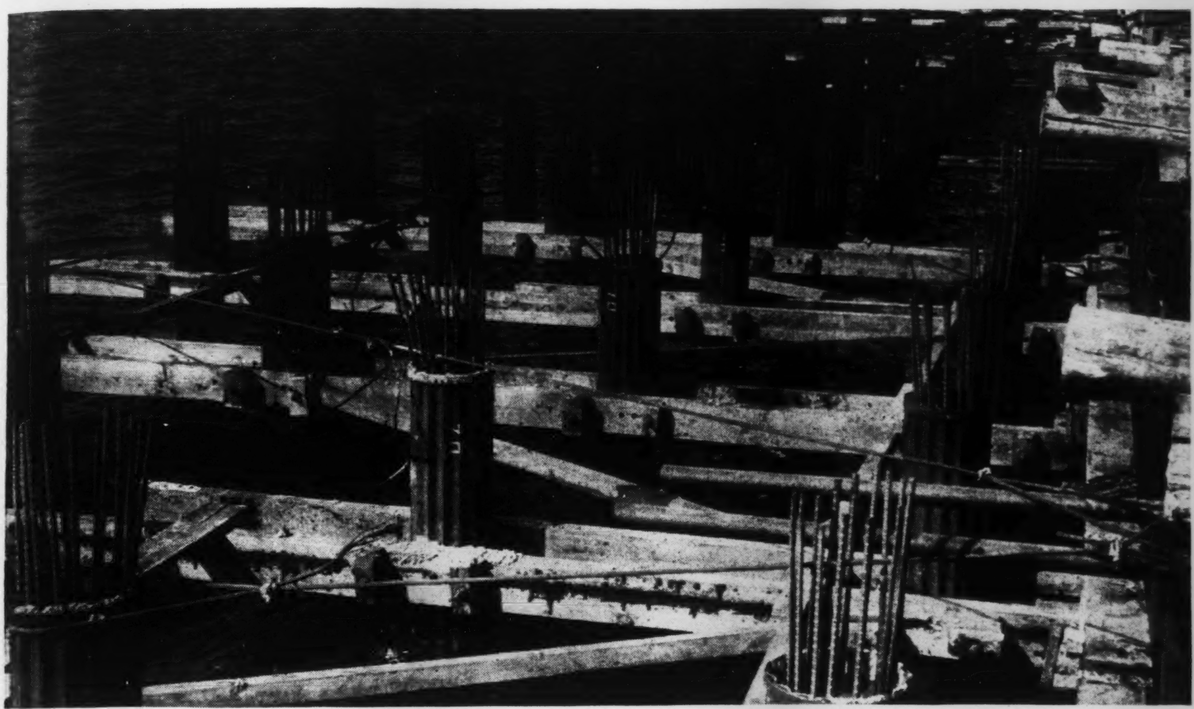


Fig. 3. After being driven, the steel tubes are filled with concrete to near the top and short lengths of reinforcing rods are inserted in the fresh concrete. These rods serve as reinforcing for the connection between the piles and the deck.

and '46 with some work on superstructures still under way.

Modern port development

The Port of Long Beach, Calif., is unique in this country in that its facilities are constructed from the original beach line out into the open waters of San Pedro Bay, an exposed bay on the Pacific Ocean. Another unique feature is that the entire port district is underlain with a very productive oil field belonging largely to the port and that, in coordinating the development of the oil field and the port facilities, a very extensive modern and highly flexible marine terminal for general cargo shipping has been built.

One of the most essential phases of reviving the peacetime maritime industry and maintaining a large and efficient merchant marine is economy of port operation. The facilities constructed should be of flexible design so that the expense of future accommodation to changed types of ships or land transportation and to unproved cargo handling devices and methods would not be so great as to preclude the essential changes being promptly made.

In developing the 4,500 lin. ft. of wharf line and some 50 acres of working space for Pier A, the following criteria are being followed:

1. Total cost is more important than first cost. Thus, emphasis is placed on maintenance-free types of construction which enjoy long life without material depreciation.
2. Fire resistance is emphasized.
3. The line of separation between water and the earth fill is kept as close to the pierhead line as is consistent with providing deep water berths. Thus, the open wharf area subject to deterioration and possible fire damage is minimized and a maximum of earth fill with unlimited load carrying capacity is available.
4. Transit sheds are located on earth fills, are free of interior columns, and have sufficient vertical clearance to accommodate future improved cargo handling methods.
5. The entire terminal from ground level up is to be a permanent structure, readily changeable to meet future conditions.

Pier area primarily fill

Victory Pier, previously mentioned, conformed with these criteria in that it was primarily of fill construction with the quay structure being of massive concrete. This concrete also served to retain the fill. A narrow earth and rock fill causeway for rail and vehicular traffic connected this pier to the mainland. The more recent construction consists of the development of the area between this pier and the existing developments adjacent to mainland, the entire structure having ten full ship berths and being called "Pier A."

Pier supported on 1,000 piles

The steel-pile-supported wharf construction at the pierhead line is a small portion of Pier A as far as total area is concerned. Yet were it by itself it would be considered a major structure, being some 32 x 2,500 ft. in plan and containing almost 1,000 bearing piles.

Except for surface features, the fill part of the pier was built first. Part of this fill was desirable spoil from outer harbor dredging and part was hydraulic fill readily available from the nearby river mouth. A dyke of shale and clay constrains the fill on the north and west sides where water depths to original sand bottom vary from 30 to 40 ft. The dyke is so located that the steel sheetpiling of the heaviest section manufactured could

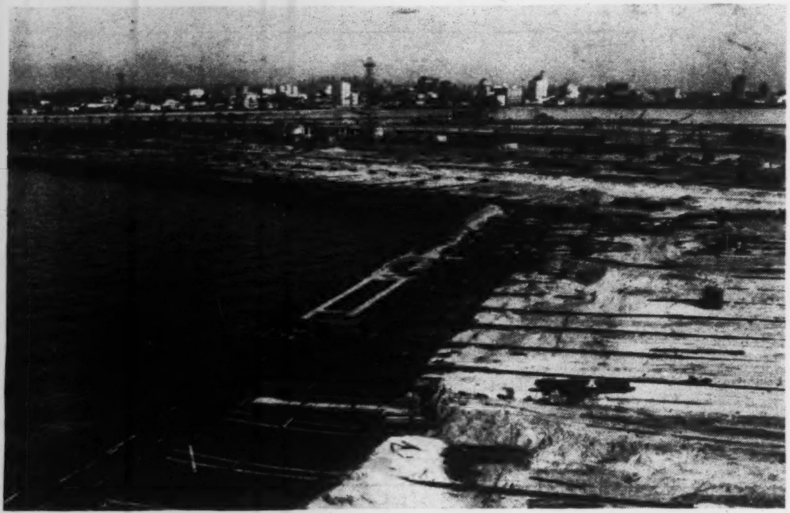


Fig. 4. General view of pier construction showing tierods for holding the sheetpiling in place.

be driven through it into the underlying sand bottom with only as much piling exposed as would result in safe flexural stresses. The driving of this sheetpile bulkhead and the steel bearing piles of the wharf structure was begun shortly after the fill was completed.

Concrete slab supported by piles

The wharf site was underlain with sharp, river-delta sand ranging in size from fine to very coarse. With pile bents spaced 10 ft. apart and individual piles in the bents spaced 8 ft. apart, sufficient bearing strength would develop. This close spacing allowed the use of flat slab reinforced concrete panels, 8 x 10 ft., entirely free of drop panels and, thus, simple of construction. The slab was constructed without expansion joints for the entire 2,500 lin. ft. of wharf length. Suitable construction and contraction joints were used. An earth fill for ballast varying in thickness from 2 ft. to 3 ft. 10 in., plus a live load of 750 lb. per sq. ft., was used as design load for the slab. It also was considered adequate to support a 50-ton gantry crane, heavy duty truck cranes, Cooper E-60 rail loading, and still provide a reasonable factor of safety for future unforeseeable loads. With all this taken into account individual pile loadings were computed to be as high as 58 tons.

Past practice in this area indicated the choice of heavy duty reinforced concrete piles to support the wharf. Plans and specifications were drawn accordingly. However, there was fear that the extremely careful requirements for handling heavy concrete piles in sea water would not be met during the period of war activities since the equipment necessary for such handling was fully engaged in handling heavy cargo lifts. This led to the initial consideration of tapered steel Monotube piles manufactured by the Union Metal Mfg. Co. The possibility of corrosion of the steel and the uncertainty of the safe capacity of the tapered pile under the conditions of the installation led to long and careful consideration of these two problems. Full static load tests were made on a pile 75 ft. long and the test results were completely reassuring.

Fig. 5. Sections of the steel castings were cut away by acetylene torch from test piles and the concrete revealed was of good quality.

The test pile had a diameter of 16 in. (tip diameter was 8 in.) and it penetrated into the foundation material some 47 ft., including 38 ft. into original sand bottom. It was driven with a McKiernan-Terry No. 10B2 hammer with 18 blows to the inch for the last few blows applied by the hammer. The pile successfully carried a load of 140 tons, at which load it settled an additional 0.75 in. over a 6-day period and stopped. The load of 140 tons caused an apparent total settlement of the pile of 1.75 in. Upon a removal of the load, the pile recovered 0.75 in., leaving a net settlement due to the load of 1.0 in.

It was found upon pulling the pile that the concrete had been placed in salt water because the pile leaked. The quality of the concrete was considerably affected so that almost the entire load was carried by the pile casing.

Corrosion carefully considered

Corrosion of steel in salt water has attracted much attention in recent years. Records of the Port of Long Beach prior to the design of Pier A and observations made at many other places indicate a maximum loss of steel on exposed surfaces of some $\frac{1}{16}$ in. over a period of 21 years. Full allowance for this much loss was made in the choice of shell thickness for the steel tapered piles.

Initial considerations called for a protective jacket of concrete from several feet below mean lower low water to the top of the pile. However, experience in protection of steel pipelines, where ground water conditions were bad and other factors contributing to electrolysis were present, indicated that partial protection of steel in salt water by concrete is likely to be an invitation to accelerated electrolytic action at the point where the protection is discontinued. Consideration was also given to the use of cathodic protection of the steel piles. Although some details of such protection are still in the experimental stages, equipment required for such a system in the original structure has been installed and the remainder of the system will be constructed in the near future.

Concrete core studied

As no precedent was available for determining the quality of concrete deposited in a tapered cylindrical form from 70 to 85 ft. long, a study was made of this problem. Two test piles were driven and the concrete poured by conventional methods through a hopper to which was attached a pipe, 16 ft. long and 8 in. in diameter. Before pouring, inspection was made of the piles and it was determined that they were dry. It was found that the piles were consistently dry and on a bright day the use of a mirror to deflect sunlight to the bottom of the pile gave adequate means of inspection.

One test pile was filled with ordinary concrete. The tip of the other was filled with 2 cu.ft. of grout made of 1 part cement to 2½ parts of sand. Concrete used had a 4½-gal.-per-sack mix and a 3-in. slump. Agitation was used in one pile and omitted in the other, except in the upper portion.

Both piles were pulled and windows for inspection at intervals of some 10 ft. were cut from the casings by use of an acetylene torch. Results were excellent and a high grade of concrete free of air and rock pockets was noted. Although air bubbles higher up in the piles were larger (½ in. maximum), no coarse aggregate was exposed.

Sections of heavy rubber fender tubing some 14 in. long and some 7 in. in diameter were used in the bumper system for the wharf. These tube sections were placed at an average of 7-ft. intervals and were supported between the concrete wharf side and a continuous heavy timber chock system which served to align and fix the position of the wooden bumper piles. The fender tubing takes the place of the conventional spring fender system.

Modern transit sheds built

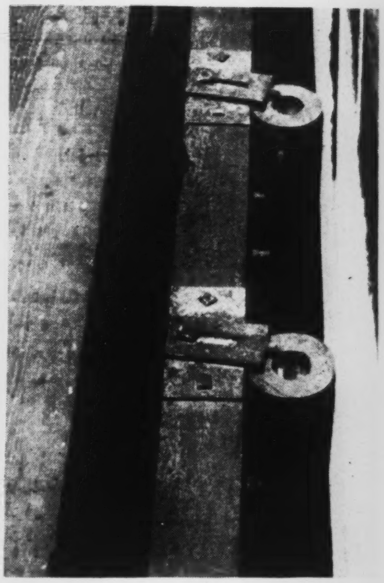


Fig. 6. Sections of heavy rubber tubing were used to provide spring action in the pier bumper system.

In accord with the policy of installing completely modern facilities, transit sheds some 200 ft. wide of clear-span construction and reinforced concrete sidewalls are being built. These sheds are supported on the fill so the load limit is relatively unrestricted. Loading platforms are sufficiently wide for lift trucks or other motorized units to circulate on them, operating readily into and out of railroad cars. Sufficient ceiling height is provided so that even relatively long-boom truck cranes can be used within the sheds for handling cargo. The objective throughout has been to eliminate excessive grades on all ramps, and the entire design makes use of smooth pavements to avoid the tipping of cargo loads and the tilting of truck wheels. A high degree of segregation of truck and rail traffic is possible because all tracks are paved over and the terminal operator can determine distribution of the two methods of transportation.

The fill contract for Pier A was held by Standard Dredging Co. The steel bearing piles were supplied by the Union Metal Mfg. Co. and sheetpiles by the Columbia Steel Co. All piles were driven by Macco Construction Co. E. B. Bishop was general contractor for the reinforced concrete wharf and general area improvements. E. J. Amar is port manager for the Long Beach Board of Harbor Commissioners, the author is chief engineer, and various phases of the design and construction were supervised by C. L. Vickers and R. D. Sandham, assistant engineers, and Raymond W. Harder, chief inspector.

Cities Buy Power Plants

Spearheaded by localities in Nebraska and Tennessee, governmental units in increasing numbers are buying electric utilities, the American Public Works Association reports.

Nebraska and Tennessee are the first states to have all electric utilities publicly owned. Throughout the nation, there are some 3,400 cities now served by electric systems owned by municipalities, cooperatives, or public power districts.

Last year an estimated 100 or more cities bought or created municipal electric utilities, following an increase of 110 cities in 1945. Greatest concentrations of publicly-owned electric facilities are in Tennessee Valley states, the middle west, and states bordering the Gulf of Mexico.

The final link in public ownership of all Nebraska electric utilities was completed this year when the Omaha public power district took title to the Nebraska Power Company in a $42 million transaction. There are at least 327 other Nebraska cities served by publicly-owned electric facilities.

In Tennessee, most municipal and cooperative electric utilities get their power through the Tennessee Valley Authority. Chattanooga has one of the largest municipally-owned utilities in the state, with an electric plant valued at more than $16 million. The plant has been in service since 1939.

Tennessee has more cities served by publicly-owned utilities than any other state, with 374 served when last counted. Nebraska is second, and Iowa third with 147 cities served. Publicly-owned electric utilities serve 146 cities in Kansas, 142 in Texas, 140 in Ohio, 137 in Minnesota, and 129 in Alabama.

According to the Public Ownership League of America, public ownership of electric utilities is growing also on the Pacific Coast. Many cities are being served by the Bonneville Power Administration, third largest distributor of power in the U. S.

Divers Dam Chicago Water Tunnel To Confine Tremie Concrete Plug

***Contents in Brief**—Before making the break-through for connection of a new intake tunnel to an existing tunnel carrying water from a crib in Lake Michigan, the Chicago department of public works bulkheaded the water tunnel at a shore shaft and unwatered the portion between the shaft and the crib. As a safeguard against contamination of the city's water supply by tremie concrete placed in the bulkhead, divers first went down into the tunnel under 135-ft. head and built dams on both sides of the shaft. These dams confined the tremie concrete and eliminated the danger of dissipating cement into the city's water system.*

To PLACE A PLUG of tremie concrete in the 14-ft. intake tunnel from the Edward F. Dunne crib, Chicago, without dissipation of cement into the city water supply, divers went down the shore shaft in 73rd St. and built dams in the tunnel about 40 ft. apart, on each side of the shaft. Working in water 135 ft. above the tunnel invert, the divers constructed double walls of bagged concrete in four lifts, up to the tunnel roof. Cores of the first three lifts in each dam were filled, lift by lift, with concrete grout delivered through pipe and hose from the street surface. No grout was placed in the fourth lift.

Diving operations to close off a section for deposition of tremie concrete were completed in 75 calendar days. After cavities in the tremie bulkhead had been filled by supplemental grouting, the lake-side tunnel was unwatered to permit connection with a new 16-ft.-dia. raw water intake tunnel for the 320-mgd. South District filtration plant at 79th St. (Fig. 1).

Since April 4, this tunnel has furnished all water to the filter plant. For 1½ years prior to that date, water to supply South District demand has been admitted to the plant through its own lake intake, now retired to standby status.

An outlet tunnel connects the filter plant and the land tunnel system serving the district. Inshore from the 73rd St. shaft, a portion of the tunnel from the Dunne crib forms part of this system. Since late 1945, when the filtration plant began partial operation, the district has drawn nearly all its water from the plant, and the crib tunnel has contributed little to the supply, merely riding on the system and carrying no important flow.

Tunnel dams

Despite this static condition, the city's engineers wished to take no chances on having cement from a tremie concrete operation or other deleterious matter enter the water system. Accordingly, they devised the plan of erecting barriers to con-

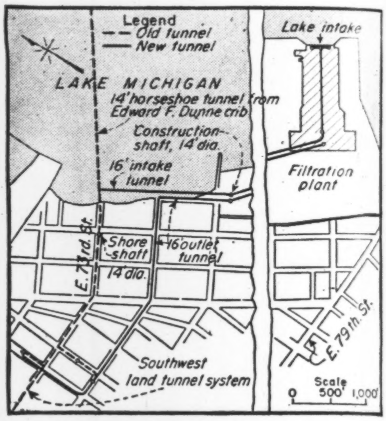

Legend
Old tunnel
New tunnel
LAKE MICHIGAN
14' horseshoe tunnel from Edward F. Dunne crib
Construction-shaft, 14' dia.
16' intake tunnel
Lake intake
Filtration plant
E. 73rd St.
Shore shaft 14' dia.
16' outlet tunnel
Southwest land tunnel system
E. 79th St.
Scale
0
500'
1,000'

Fig. 1. New 16-ft. intake tunnel connecting with 14-ft. tunnel from crib in Lake Michigan replaces lake intake used by filtration plant during first 1½ years of partial operation, but now reserved for emergency services. Bulkhead construction at bottom of shore shaft in 73rd St. shuts off crib tunnel for unwatering to permit making intake connection. Outlet tunnel from plant supplies water to land tunnel system.

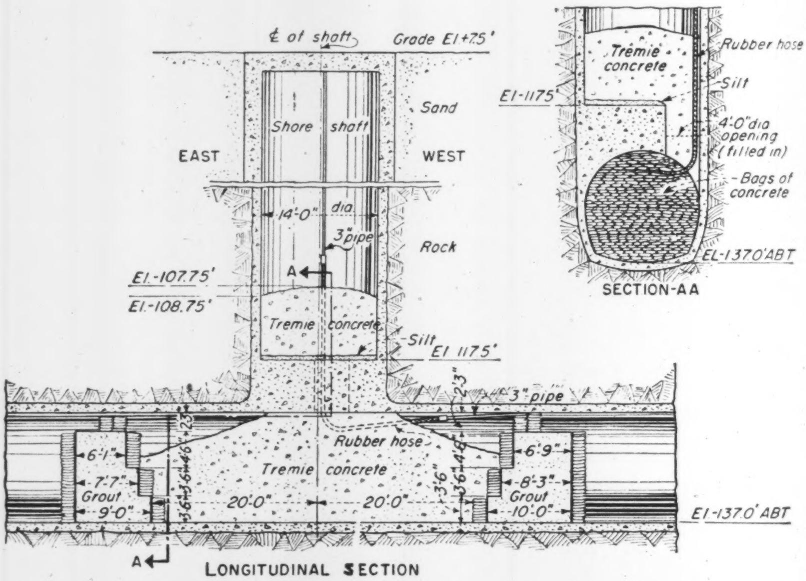

℄ of shaft
Grade El +7.5'
Shore shaft
Sand
EAST
WEST
14'-0" dia.
3" pipe
Rock
A
El. -107.75'
El. -108.75'
Tremie concrete
Silt
El 117.5'
2'3"
3" pipe
2'3"
Rubber hose
6'-1"
7'-7"
Grout
9'-0"
3'6"
3'6"
4'6"
Tremie concrete
20'-0"
20'-0"
3'6"
3'6"
4'8"
6'-9"
8'-3"
Grout
10'-0"
El -137.0' ABT
A
LONGITUDINAL SECTION
Tremie concrete
Rubber hose
El -117.5
Silt
4'-0" dia opening (filled in)
Bags of concrete
EL -137.0' ABT
SECTION-AA

Fig. 2. Two double-wall dams of bagged concrete built up in lifts by divers, with grout filling between walls in first three lifts, form inclosed space for safe deposition of tremie concrete in tunnel bulkhead. Pipe and hose line leading to west side of bulkhead permits feeding materials from top of shaft to stop small leaks while tunnel on other side of bulkhead is being unwatered.

fine tremie concrete. A diving firm was awarded a contract to build the dams. All other work was performed by the construction division of the city's department of public works.

As built by the divers, the dams are respectively 9 and 10 ft. thick between bag walls in the first lift, which is about 3½ ft. high (Fig. 2). Bag walls farthest from the shaft were laid up vertically for two additional lifts, while walls nearest the shaft were stepped in at each lift to furnish a working bench. Grout was placed between the bag walls in each of the first three lifts. The fourth lift consisted of double walls of bagged concrete.

Preparatory work

Both the crib tunnel (14-ft. horseshoe section) and the intake connection (16-ft. horseshoe) are concrete-lined conduits in rock, with invert elevations about 135 ft. below mean water level in Lake Michigan. Before starting dam building operations in the 14-ft. tunnel, the city forces closed the crib intake gates and cut a 4x5-ft. street opening into the 22-in. concrete cover slab of a shore-shaft manhole. Directly under the manhole and about 125 ft. below it was a 4-ft.-dia. opening in the tunnel roof, tangent to the shaft wall and to the side wall of the tunnel.

Inside the shaft at 10-ft. vertical intervals are 9-in. horizontal steel beams, supporting two permanent ladders which extended downward into the tunnel. The ladders are on the inner side of the steel beams, at a distance of about 30 in. from the shaft wall. The space between the beams and the shaft wall was kept clear for use by divers.

On the other side of the steel beams, the construction crew hung pipe lines for delivery of bagged concrete and for pumping grout. For dropping bagged concrete, the crew installed 110 ft. of 12-in.-dia. sheet iron pipe attached by clamps to two ½-in. wire ropes, with 30 ft. of canvas tube at the bottom reaching to within 4 ft. of the tunnel floor. In preparation for grouting, the city's crew also hung 80 ft. of 3-in. pipe on one ½-in. wire rope, with 50 ft. of 3-in. pressure hose at the lower end. Each 20-ft. length of pipe was clamped by a welded lug to the rope.

To facilitate handling of bagged concrete by the divers, a two-wheeled cart was lowered into the tunnel, and a track 30 ft. long of 9-in. steel channels in 10-ft. lengths was laid on the tunnel floor, bags of concrete being used to level the rails. The divers found no silt or other loose material on the tunnel floor, but they reported a deposit on the shaft bulkhead on top of the tunnel, sloping upward from the edge of the manhole opening.

Divers worked on the bottom under 60-lb. pressure for about 1 hr. at each descent, and another hour or more was required to allow for decompression during ascent. Two divers participated in each day's operations, one going down in the morning and the other in the afternoon. Including inspection and preliminary work, the divers made 84 descents in building the dams.

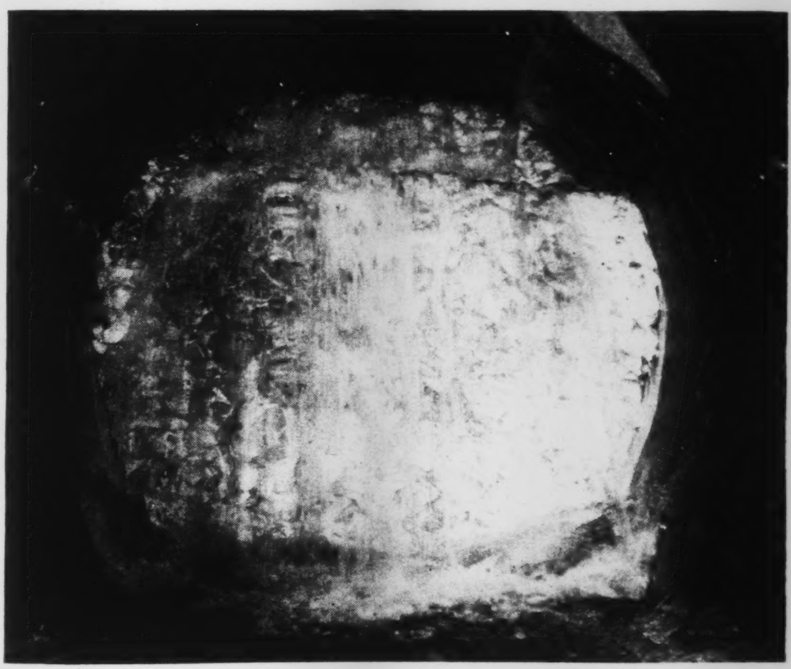


Fig. 3. Under 135-ft. head bulkhead in 14-ft. tunnel passes about 1,100 gpm. of leakage here shown tumbling over east wall of bagged concrete. Most of leakage comes through top of bulkhead, near tunnel roof.

Fig. 4. Break-through from pilot heading of intake tunnel is enlarged to afford ready access to crib tunnel. During unwatering of crib tunnel, drainage was admitted to intake tunnel through drilled outlet holes fitted with control valves.

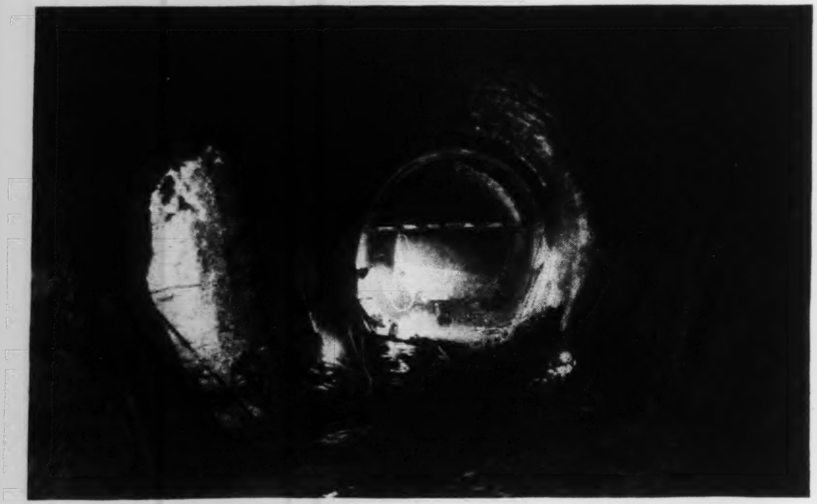


Fig. 5. After enlargement of break-through opening, at left, workmen begin construction, in background, of permanent concrete bulkhead keyed into rock behind tunnel lining. Steel pipe already in position passes leakage through this bulkhead during its construction.

For emergency use, the construction division made a recompression chamber at the municipal shops from an old 4x11-ft. water storage tank. The chamber was used several times to relieve mild distress and once after a too rapid ascent caused by a leak in the diver's hose.

Bagged concrete

Dry concrete mixture for the dam walls was placed in cloth cement sacks of 1-cu.ft. capacity, each bag being about half filled. The first 539 sacks contained a mix of cement, torpedo sand and No. 8 gravel in about 1:2:3 proportions. Under water, a half-filled bag of this mixture weighed about 45 lb.

To reduce weight, the remaining 1,727 bags (of a total of 2,266 dropped into the tunnel) were filled half full with a mixture of cement and granulated slag in about 1:2 proportions. These bags weighed about 16 lb. under water.

All bags were laid longitudinally with the tunnel to form walls of a thickness equal to the length of the tied sacks, 18 to 20 in. The average wall area closed per bag was 0.32 sq. ft.; thus each wall required about three bags per square foot.

To deliver grout for the core between bagged concrete walls, the construction force first tried an air placer, with poor success, and then changed to a horizontal pump powered by compressed air. Above the 6x4x7-in. pump, the crew set up a hopper to feed grout mixture to the pump intake. A "Y" in the discharge line was used for cleaning and, later, for introduction of roofing gravel into the grout.

First lifts of the dams were filled with a wet grout mixed in batches containing 10 bags of cement and 20 to 24 cu. ft. of mason sand. Later the same mix was used with the addition of 3 cu. ft. of roofing gravel dropped into the line after grout left the pump. The line plugged once, causing the loss of one batch.

(Photo by Charles Gerringer)

Fig. 6. Diver begins descent through shore shaft into crib tunnel, preparatory to building bagged concrete dams.

Reports by divers indicated that grout set up satisfactorily. Each lift was covered with laitance about 2 in. deep. This was removed by dragging the bags for the back wall of the succeeding lift across the concrete.

The third lift raised the dams to within 24 to 30 in. of the tunnel roof. For the fourth lift, the divers laid up sacked concrete in double walls to complete closure of the tunnel, except for an opening about 2 ft. wide and 3 to 4 in. deep next to the roof on each dam. A 3-in. line made up of steel pipe and wire-wrapped hose was installed in the shaft and through the west dam (Fig. 2) for later use in introducing sawdust and similar material to stop small leaks in the tremie bulkhead.

Preparatory to placing tremie concrete, divers removed loose sand, silt and dead cement from the tunnel floor with an air lift. The air lift was used also to remove the silt deposit at the junction of shaft and tunnel.

Tremie concrete

For placing tremie concrete, the construction force installed an 8-in. welded pipe 135 ft. long, reaching to the tunnel floor. This pipe was suspended from the load line of a crawler crane on the street surface. From a second line of the same crane was hung a 10-ft. length of 7-in. pipe telescoping inside the 8-in. tube. A 36-in.-dia. hopper at the top of the 7-in. pipe received concrete from the discharge chute of a paving mixer. This mixer turned out 1.05-cu. yd. batches of about 1:1½:2 mix (790 lb. of cement 1,260 lb. of torpedo sand and 1,840 lb. of No. 6 and No. 8 gravel).

To start tremie concreting, a wad of cement bags was placed in the 8-in. pipe, resting on the tunnel floor, and the pipe and hopper were filled with concrete. The pipe then was raised slightly until concrete started to flow. No trouble was experienced in holding the seal in the pipe against water pressure. The pressure supported a concrete column to a height of about half the length of the pipe but did not break through.

Twelve batches of tremie concrete were placed in a trial run. Several days later, the tremie outfit deposited 120 cu. yd. in the tunnel and up into the shaft to a height of about 7½ ft. above the shaft bottom.

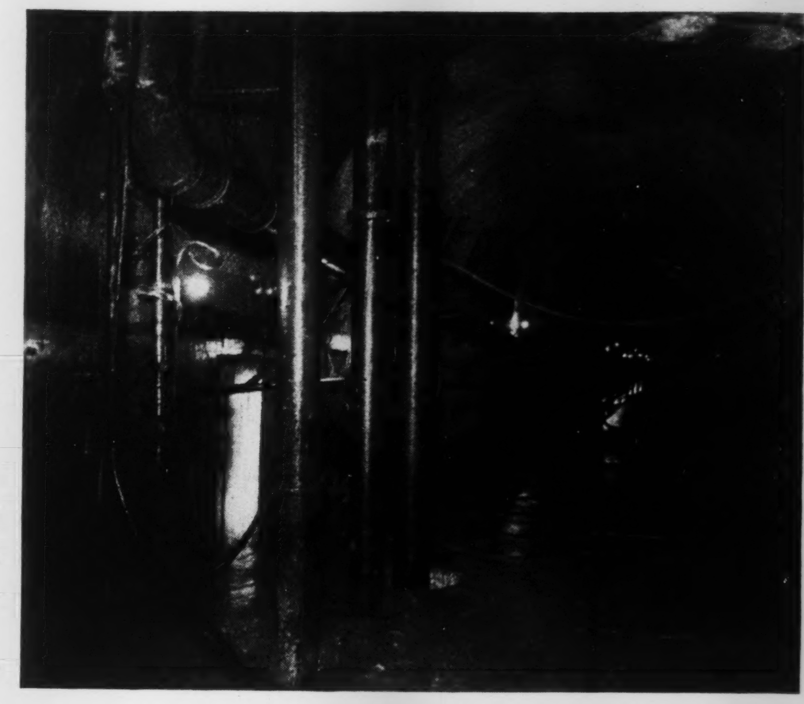


Fig. 7. At shaft in new intake tunnel, suction risers to three pumps remove drainage admitted from crib tunnel.

Following the tremie operation, attempts to drain the tunnel between the tremie bulkhead and the crib proved futile. Unwatering of this portion of the tunnel, 2.16 mi. in length, required the pumping of 7,000,000 gal. plus leakage. Pump capacity available at the time was about 2,000 gpm. Leakage past the bulkhead evidently exceeded this capacity, as the pumps made no progress in lowering water level at the crib. Wood shavings and sawdust introduced through the 3-in. line west of the bulkhead did not stop inflow.

Additional sealing of the bulkhead obviously was necessary, and the construction division decided to inject grout. After pumping out the shaft, miners drilled three vertical holes through the tremie concrete and part way into the shaft-bottom concrete, below the silt seam (Fig. 2). Pipe sleeves were driven in these holes, down into the old concrete, and grouted to seal them against leakage. Shut-off valves were mounted on the sleeves.

A compressed air test showed that only one of the three sleeves was sealed tightly. Inside this sleeve, miners drilled through the old concrete into the tunnel. A sounding made with a steel rod through the hole indicated a void about 1½ ft. deep under the tunnel roof at this point.

Grout was forced into the tunnel through a 2-in. pipeline connected to a plug cock at the top of the valve on the sleeve. Placing of the first 25 cu. yd. of wet 1:2 grout did not develop much pressure and some gravel was dropped into the grout line at the top of the vertical pipe, connected by a tee to the pump's horizontal discharge. When 23 batches containing 9 bags of cement and 24 cu. ft. of sand were placed on the following day, back pressure indicated that the bulkhead cavity was filled.

Unwatering tunnel

After grouting the bulkhead, the second attempt to drain the tunnel produced quick results. At the crib, a diver stopped leakage through the shaft gates. With water being drained out of the tunnel at the rate of about 2,000 gpm., equal to the capacity of the two available pumps, the water level in four days dropped to about 5 ft. above the tunnel floor. A third pump then was installed to give added capacity.

Water was drained from the crib tunnel through outlet holes which had been drilled into it from a pilot heading in the intake tunnel. These holes, pentrating a rock barrier about 8 ft. thick, had been fitted at their inner ends with gate valves on flanged pipe nipples, bolted to lead cinch anchors in the rock, prior to final drilling through into the crib tunnel. Flow was controlled in accordance with the capacity of the pumps, installed in a construction shaft in the intake tunnel. As the head dropped, additional holes were drilled, and finally a small opening was blasted into the tunnel to take out the last few feet of water.

As a precaution against sudden flooding of the tunnel in event of failure of a gate in either of the two crib shafts, safety platforms were erected just below the gate sills. These platforms consisted of 12-in. steel beams at about 20-in. centers, resting on the concrete walls of the shafts and covered with 3- and 4-in. planks laid edge to edge with no attempt to make them watertight.

Leakage into the crib tunnel after unwatering continued at a rate of about 1,200 gpm., of which about 1,100 gpm. came through the construction bulkhead, most of it apparently over the top. Attempts to reduce this leakage by washing wood shavings and sawdust through the 3-in. line were unsuccessful.

After enlarging the opening from the intake tunnel into the crib tunnel to usable size, the construction crew built a permanent bulkhead of nonreinforced concrete 8 ft. thick, keyed into the rock walls, about 50 ft. west of the intersection. This bulkhead stopped all leakage into the crib tunnel. Excavation and concrete lining of the intake tunnel connection then were completed.

Work done by city

The work was planned and executed by the Chicago Department of Public Works, under the general direction of Oscar E. Hewitt, commissioner, and W. W. DeBerard, city engineer. All field operations were carried out by the construction division, headed by John S. Dean, engineer of waterworks construction. Arthur G. Anderson was resident engineer. Work requiring divers was performed under contract by the Superior Diving & Salvage Co., Chicago.

Steel Erection for the Terrace Plaza Hotel

***Editors Note**—Erection of structural steel for the $12,000,000 Terrace Plaza Hotel building in Cincinnati was simplified and expedited by carefully coordinating delivery of steel and erection schedules. Unusual job conditions required many derrick moves, both vertically and horizontally. Nearly all of the 6,200 tons of steel was erected in a five-month period. A description of the design highlights appeared in ENR, Aug. 7, vol. p. 196, and of the foundations July 10, vol. p. 30.*

CAREFUL advance planning of steel erection in the 6,200-ton steel skeleton of the 18-story Terrace Plaza Hotel building in Cincinnati turned what promised to be a steel erector's nightmare into a smooth-working operation from start to finish. A confined construction area in the very heart of the city, deep foundation excavation requiring an unusually intricate system of timber bracing, and structural requirements of the architectural design—all combined to create a construction challenge of considerable magnitude.

Added to these difficulties was the absence of storage space at the site, which necessitated accurate coordination between delivery of the steel and its erection. Large setbacks at the eighth and ninth floors required drastic repositioning of the guy derricks at the ninth floor level, to erect the steel above.

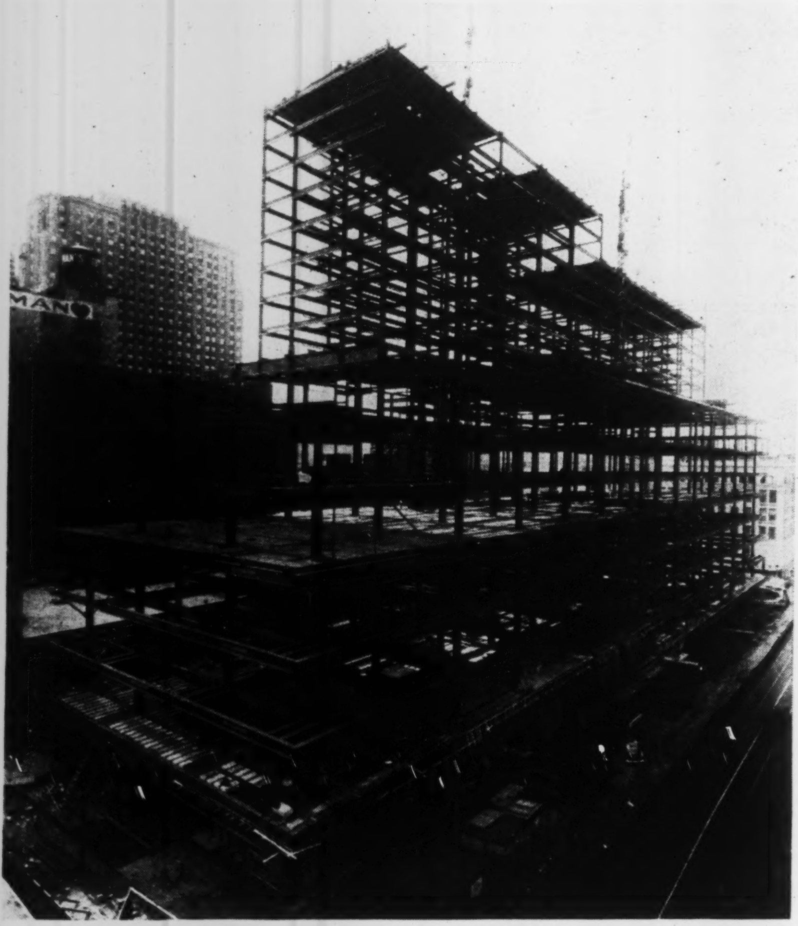


Fig. 1. With a steel frame for two seven-story department stores as a pedestal the Terrace Plaza Hotel in Cincinnati towers 268 ft. above street level.

Four guy derricks were used—three, with 100-ft. mast and 90-ft. boom for the main structure and one with 80-ft. mast and 70-ft. boom for the nine-story annex. A total of 34 derrick moves were made during erection of the 18-story building, penthouse and annex—29 moves consisting of conventional two-story jumps, and 5 involving horizontal repositioning that required expert handling of the 12-ton derricks.

Columns erected in two-story lengths

For a better understanding of the erection problems involved, the following is a brief description of the steel skeleton and foundation bracing:

The steel framing is supported by rolled beam columns, some with cover plates. The heaviest column section —a 14-in., 320-lb. WF beam with two 22 x 3⅜-in. cover plates weighed 16 tons. Columns were fabricated and erected in two-story lengths (Fig. 1).

Floor beams are rolled sections, some having cover plates, and built-up plate girders (Fig. 4)—the heaviest of which weighs 12 tons. In general, the main floor girders, or header beams, extend across the narrow width of the building.

Wind bracing connections were kept to a minimum and considerable headroom was saved particularly in the main section of the building below the eighth floor, by using a double line of header beams at each transverse line of columns. These beams extend past the columns, with special off-set connections from beam web to column flange and with field splices located in the central bay of the three-span framing.

Below the eighth floor, which will be devoted primarily to two department stores (*ENR* Aug. 7, vol. p. 196) the steel skeleton measures 380 x 82 ft. c. to c. of exterior columns and 400 x 90 ft. out-to-out of building lines. It is bounded by 6th St. on the north, Vine St. on the east, Race St. on the west and Thorpe Alley on the south. The nine-story annex, situated about midway along the south line of columns, measures 93 x 44 ft. between exterior column lines.

Large setback at eighth floor

Above the eighth floor, the steel framework sets back to form the hotel, which measures 308 x 48 ft. c. to c. of exterior columns (Fig. 1). The hotel lobby is located at this floor. The 19th floor steel forms the roof of the hotel, above which is a circular dining room at one corner (Fig. 5) and a 47-ft. high steel-frame penthouse. Total height of structural steel from penthouse roof to street level is 268 ft.

Functional requirements of the department stores called for large column spacing. Consequently, transverse column spacing below the eighth floor is 24 ft. 1 in., 33 ft. 10 in. and 24 ft. 2 in. Longitudinally, there are two 22-ft. bays at the east end followed by twelve 28-ft. bays. In the hotel portion of the building, from the 8th to the 18th floor, longitudinal spacing of columns coincide with those below. Transverse spacing, however, is 13 ft. 10 in., 20 ft., and 13 ft. 10 in.

Column load transfers were kept to a minimum, however, by establishing the setback along 6th St. so that two longitudinal lines of columns in the hotel coincide with column lines below. Thus, only about 50 percent of the hotel columns have to be carried on heavy floor girders at the eighth and ninth floors.

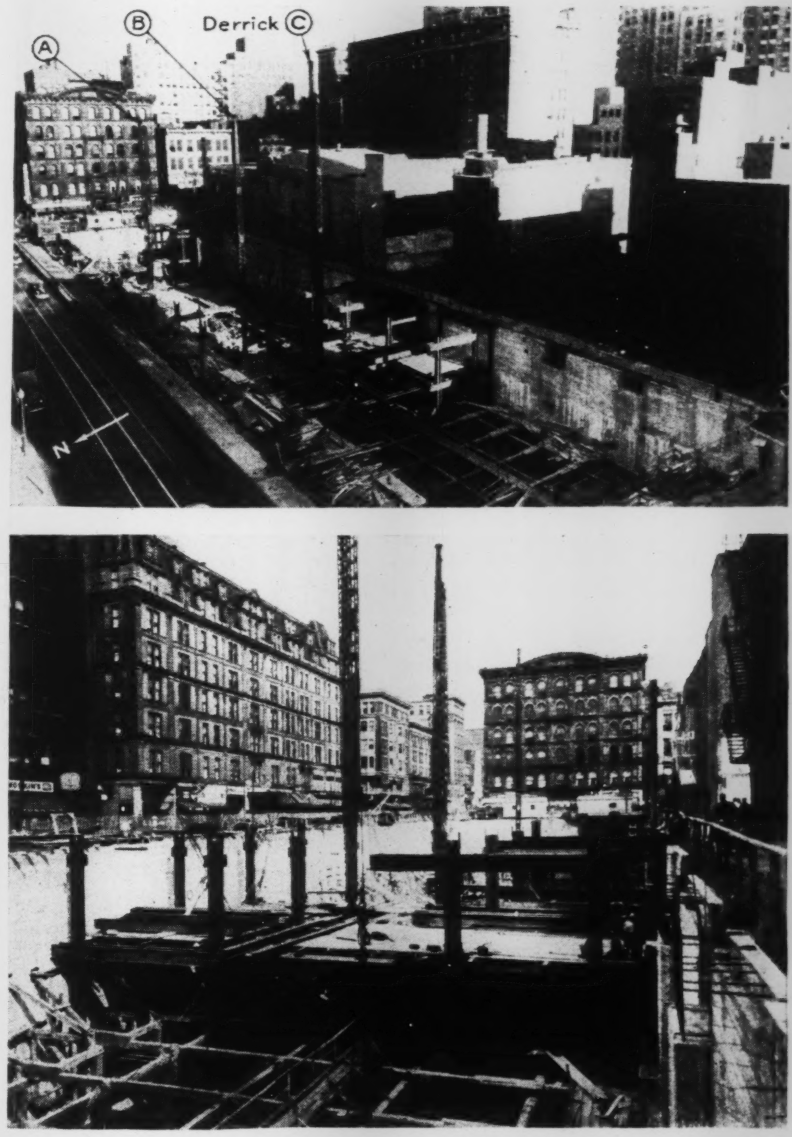


Fig. 2. Derrick C, erected initially on basement steel near the center of the building (top) was moved one bay west, jumped one floor and moved west again during erection of the steel below the first floor. Cross-lot timber bracing in the west end of the excavation (bottom) made steel erection difficult.

Excavation 56 ft. deep

Two lines of columns at the west end of the main building and eight at the east end extend down to the sub-basement 31 ft. below street level. The five intervening lines go on down to the boiler room floor 51 ft. 9 in. below street level. It was in this area that cross-lot timber bracing caused the most difficulty in erecting strucural steel. Maximum depth of excavation below street level was 56 ft.

Short diagonal timber struts from column footings to timber sheeting in the east end of the excavation, which extended only to the sub-basement level, left ample room for steel erection. But the decision to use timber cross-lot bracing between steel sheeting in the boiler room area, increased the difficulty of operating and manipulating the erection derricks in that area, not to mention the difficulty of threading sub-basement floor steel in place beneath the timber struts.

Forewarned of the difficult steel erection to be encountered below the first floor or ground level, the erector laid his plans well in advance. His first move was to erect two derricks at sub-basement elevation — derrick A which would be used to erect the steel in the east one-third of the building up to the ninth floor, and derrick B for erection of steel in the central one-third of the building.

They were set up several weeks in advance of the start of steel erection in order that their 100-ft. masts and 90-ft. booms could be assembled at the site, lifted into position, and rigged, with a crawler-type crane that was still excavating in the boiler room area.

Foot-blocks for these two derricks

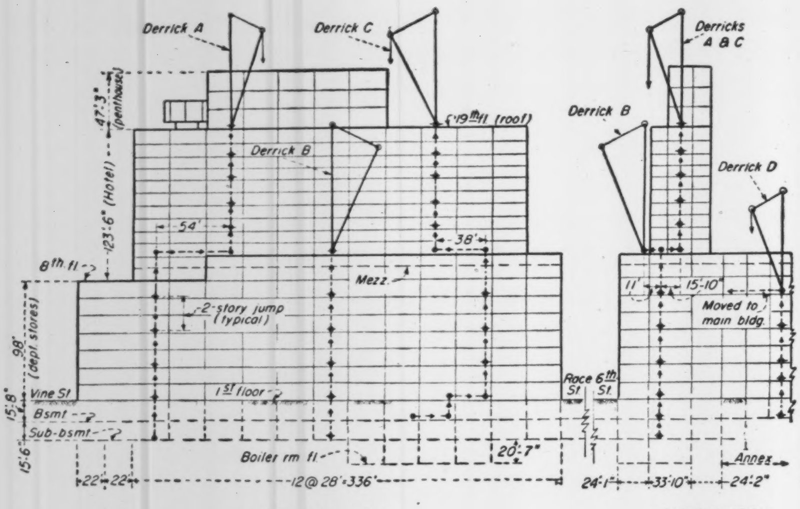


Fig. 3. In addition to the normal two-story jumps of the guy derricks, drastic repositioning of the derricks at the ninth floor was made necessary by setbacks for the hotel portion of the steel skeleton.

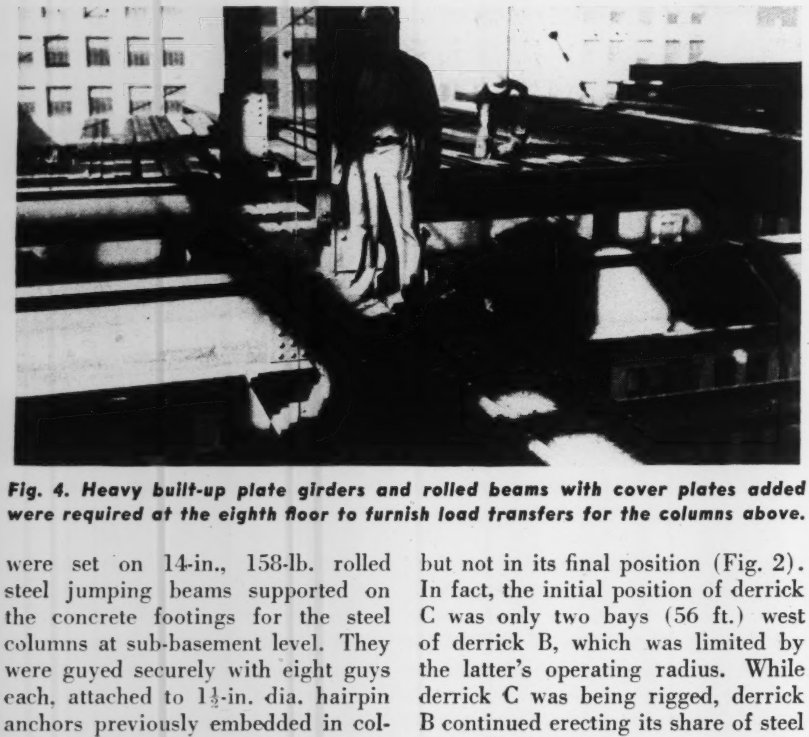


Fig. 4. Heavy built-up plate girders and rolled beams with cover plates added were required at the eighth floor to furnish load transfers for the columns above.

were set on 14-in., 158-lb. rolled steel jumping beams supported on the concrete footings for the steel columns at sub-basement level. They were guyed securely with eight guys each, attached to 1½-in. dia. hairpin anchors previously embedded in column footings.

Upon completion of the excavation, derrick A erected its portion of steel up to the first floor. At the same time derrick B erected one tier of columns and one bay of sub-basement and basement floor steel; the latter forming the support for derrick C which erected steel in the west one-third of the first nine stories.

Derrick B then erected derrick C, but not in its final position (Fig. 2). In fact, the initial position of derrick C was only two bays (56 ft.) west of derrick B, which was limited by the latter's operating radius. While derrick C was being rigged, derrick B continued erecting its share of steel up to the first floor.

Three moves—two horizontal and one vertical—were required to get derrick C in final position for erecting its portion of steel up to the first floor. Throughout the entire operation none of the existing cross-lot bracing in the boiler room excavation area could be used as a support—the derrick had to be supported at all times on previously erected steel.

With derrick C in its initial position, resting on two 14-in., 158-lb. jumping beams, supported on floor beams at the basement level, it first erected the next tier of columns to the west, together with sub-basement and basement floor steel. Two more jumping beams were laid on the basement steel and the derrick was slid 28 ft. west—a rather ticklish operation.

While in its second position, at basement level, derrick C again erected the next tier of columns to the west, but this time it installed all steel in that bay up to and including the first floor. At the same time, it completed erection of all steel behind it up to the first floor.

At this stage of operations, derrick C was jumped one story and landed on first floor steel. Another cycle of erecting the next tier of columns, from sub-basement to first floor, together with floor steel, followed by sliding it another 28 ft. west onto a set of jumping beams brought the derrick into its third position, from which it could complete the erection of all steel in the west one-third of the building up to and including the first floor.

While derrick C was being moved, jumped, and moved again to its third position, the other two derricks had completed erecting steel up to the first floor and had been jumped from basement level to that floor (Fig. 3). In the meantime, the fourth derrick used on the job, derrick D, had erected steel in the annex up to the first floor.

Erection below ninth floor

Erection of steel from the first to the ninth floors proceeded in conventional manner, with all four derricks being jumped two floors at a time (Fig. 3), and carrying their erection floor planking along with them as they went. Solid planking of 2-in. timbers on 10-in., 33-lb. temporary beams formed working platforms for both the erecting crews and the riveting gangs. This planking was never more than three floors below the riveting gangs.

The 10-in. beams were spaced 10 ft. 6 in. apart. They rested directly on the permanent floor beams which are spaced 28 ft. apart. Some 4,100 timbers 2 x 12 in. by 22 ft. long were needed for planking, and 250 temporary steel beams.

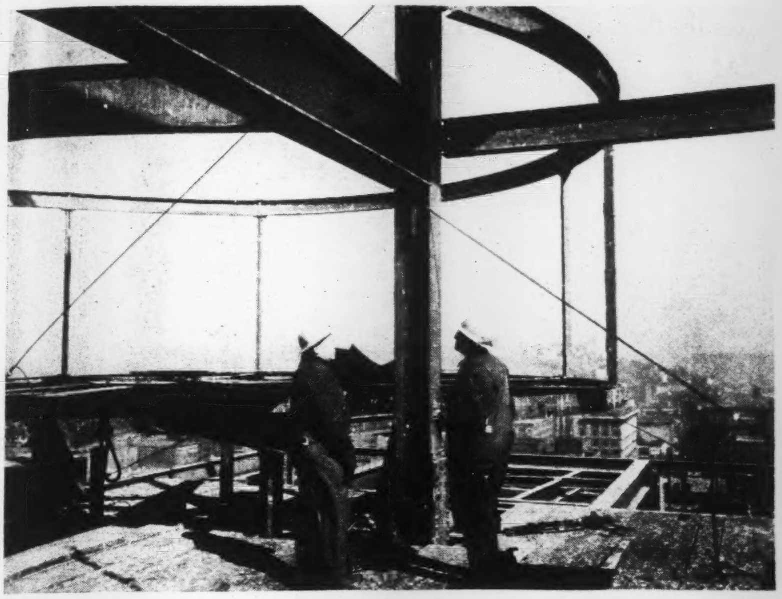


Fig. 5. Situated above the 19th floor, or roof, will be a 38-ft. dia., glass enclosed circular dining room with a seating capacity of 55.

All steel in the main portion of the building, which was erected by the three large derricks, was delivered by truck to a narrow one-way driveway established on the street sidewalk area along the north side of the building. Lack of storage space required all this steel to be picked up directly from the trucks and either erected in final position or stored temporarily on previously erected floor steel.

To simplify erection, each of the three large derricks was assigned one-third of the main building area, five bays long and three wide. In addition to the usual erection mark, each piece of structural steel carried markings indicating the tier or floor number and the area in which it would be located.

By carefully scheduling the order in which steel arrived at the railhead and by loading the cars at the fabricating plant with structural members assigned to any one particular derrick, the amount of sorting and rehandling of steel on the job was kept to a minimum.

Steel for the annex was trucked to the end of that part of the building within easy reach of derrick D. In general, each of the 90-ft. booms was able to reach out, pick up and place, the structural sections in its area of the building. Some of the 16-ton sections of columns, and 12-ton girders on the eighth floor required two derricks for picking them up from the trucks, due to the long lifting radius involved.

Derricks repositioned at 9th floor

When all steel had been erected to the ninth floor, and the three large derricks jumped to that level, they were repositioned to facilitate erection of the remaining 10 stories of hotel steel (Fig. 3).

Derrick A, at the east end of the building, was moved 54 ft. west and 16 ft. south. Derrick C, at the other end of the building, was moved 38 ft. east and 16 ft. south. In their new positions, these two derricks were able to erect all remaining steel in the hotel by being jumped vertically as necessary.

Repositioning of derricks A and C, at the ninth floor, was accomplished with the aid of derrick D, which was moved from the seventh floor of the annex to the ninth floor and positioned first for moving derrick A, then moved several feet east to where it could pick up derrick C and place it in its new location. Derrick B was used in manipulating derrick D preparatory to its shifting the other two derricks.

With the other two derricks in their new positions, derrick B was moved under its own power 11 ft. north to a point 3 ft. outside of the north line of hotel columns and 21 ft. from the north line of columns in the department store area below.

In this position, which was about midway between Vine and Race streets, derrick B acted as a relay derrick—picking up steel from street level and landing it on ninth floor steel, from where the other two derricks erected it in position.

Some 60,000 field rivets were driven on the job. Air for driving rivets was furnished by a 320-cfm., two-stage electric compressor with a 500-cu.ft. storage tank in the basement and an auxiliary 250-cu.ft. storage tank located on the ninth floor to furnish an adequate supply of compressed air for riveting the upper floors.

Although the first two derricks were erected about Aug. 15, 1946, steel erection was not started until Sept. 16. Derrick C was erected Sept. 26, moved to its second position Oct. 8, jumped one story and moved to its third position by Oct. 24.

By Nov. 6, all steel had been erected up to and including the first floor, and all derricks had been jumped to that elevation. By Feb. 27, 1947, only 35 of the 6,200 tons of steel in the 18-story building remained to be erected, with completion scheduled to follow soon.

Contractors and architects

All structural steel was furnished and erected by the Bethlehem Steel Co. For the steel company, G. A. Caffall and L. L. Martin were manager and assistant manager of erection, respectively. Field representatives were C. E. Zellers, resident engineer and C. W. Lowman, job superintendent.

W. A. Forshee is project manager for the general contractor, Frank Messer and Sons, Cincinnati, and William Raidt is field superintendent. Thomas Emery's Sons, are the owners of the hotel building, which is estimated to cost $12 million.

Skidmore, Owings & Merrill, New York City, are the architects. Their field representatives are Edwin M. Pratt, field manager, and W. C. Fisher, construction superintendent. Consultants on the project include Moran, Proctor, Freeman & Mueser (foundations), and Weiskopf & Pickworth (structural design), both firms of New York City.

Water-Sewerage Needs Are Analyzed

Engineers of the U. S. Public Health Service estimate that more than a $6 billion expenditure will be required to meet essential water supply and sewage disposal needs in the 48 states and the District of Columbia. This is one of the conclusions drawn from a recent inventory of sanitations needs, (*ENR*, July 10, vol. p. 42).

Further details of the inventory analyzing the cost of water supply and sewerage facilities by states and also by size of community are given in the accompanying tabulation. It will be noted from this tabulation that nearly $2.27 billion is required for development and extension of water supplies, and about $3.75 billion for construction of sewers and treatment plants.

Considering water projects in the United States as a whole, the greatest need is for expansion of distribution systems; this category of work accounts for more than 48 percent of the total estimated cost or about $1.1 billion. By cities this demand is almost evenly divided between those over and under 10,000 population, or $570 million and $526 million respectively.

On the other hand, development of water supply sources for cities with more than 10,000 persons will require about $689 million, or about 90 percent of the total estimated for this type of work.

Sewers are in the greatest demand for large and small cities alike. About $2.5 billion or some 67 percent of the total estimated for sewage disposal facilities will be needed for such projects.

By states, the greatest want of water supply sources is shown by Pennsylvania where satisfaction of requirements calls for an expenditure of $358 million: New York follows with $163 million; and Colorado comes third with about $69 million.

Water treatment projects are required in the greatest amounts by Illinois, Ohio and Pennsylvania with demands of $76, $48, and $20 million, respectively. But the most distribution systems are needed by Michigan, California, and New York with estimates of $119, $101, and $65 million in that order.

New York, Pennsylvania, Illinois, and California show tremendous demands for sewerage and sewage disposal works; and Nevada, Vermont, Wyoming and Delaware exhibit the least needs in this respect.

ESTIMATE OF WATER AND SEWERAGE WORKS NEEDED BY STATES
(Costs in Thousands of Dollars)

STATE	Water Supply				Sewage Disposal		
	Source	Treatment	Distribution	Misc.	Sewers	Treatment	Mi
Alabama	2,813	2,910	10,041	718	15,502	15,538	131
Arizona	575	150	1,923	5,027	6,938	3,885	16
Arkansas	2,523	3,340	15,766	67	13,344	12,747	65
California	4,180	11,728	101,583	3,472	74,225	57,355	1,182
Colorado	68,684	5,174	10,990	331	4,404	6,043	....
Connecticut	10,617	2,285	7,005	213	24,236	14,958	....
Delaware	40	462	1,547	12	4,540	3,485	2
Dist of Columbia	2,713	8,088	27,092	3,534	9,338	1,815	75
Florida	1,864	9,458	24,265	2,417	45,798	26,804	786
Georgia (1)	2,914	4,075	14,122	960	28,043	19,886	121
Idaho	448	719	7,791	35	6,775	5,153	....
Illinois	3,091	75,748	57,574	1,846	190,301	46,201	34
Indiana	2,207	15,644	25,296	311	56,794	34,474	41
Iowa	3,395	10,709	18,268	316	34,825	29,827	1,590
Kansas	1,869	3,919	15,335	98	32,847	17,040	94
Kentucky	2,705	4,617	14,542	187	22,443	17,496	471
Louisiana	1,138	6,129	24,263	1,182	23,964	12,847	845
Maine	651	396	5,220	46	11,937	8,022	29
Maryland	26,317	4,863	14,149	156	34,731	8,875	....
Massachusetts	7,473	5,717	39,421	1,478	42,503	25,023	2,732
Michigan	2,752	11,272	119,130	1,688	111,146	37,499	4,451
Minnesota	4,174	5,194	36,360	77	36,810	19,413	29
Mississippi	621	1,286	8,702	757	11,293	9,488	111
Missouri	5,062	9,626	33,505	3,939	57,941	62,161	30
Montana	428	1,337	6,830	1	4,519	4,231	15
Nebraska	2,253	4,631	12,042	326	13,183	14,517	1,311
Nevada	210	61	1,590	7	1,339	860	5
New Hampshire	656	1,894	3,779	15	4,140	6,025	....
New Jersey	5,768	3,741	20,846	2,729	88,120	60,567	709
New Mexico	842	289	4,133	226	4,842	6,298	7
New York	163,203	18,235	64,922	822	905,051	195,094	158
North Carolina	10,273	11,417	30,499	531	25,201	39,674	535
North Dakota	1,467	2,613	12,353	24	7,417	4,707	3
Ohio	12,963	48,450	54,862	1,989	59,895	75,974	1,137
Oklahoma	3,709	4,730	18,202	299	17,351	18,902	23
Oregon	985	1,361	15,637	84	17,386	12,564	....
Pennsylvania	357,851	20,354	49,645	133	209,082	131,516	351
Rhode Island	6	2,842	1,541	1,033	6,015	2,902	....
South Carolina	1,293	2,786	6,579	288	12,578	9,879	27
South Dakota	1,405	4,692	6,893	11	4,777	5,524	....
Tennessee	1,232	2,254	13,968	1,379	33,075	17,047	128
Texas	18,109	11,651	47,451	3,196	47,097	31,176	767
Utah	741	1,474	10.972	91	18,343	9,390	....
Vermont	421	864	708	30	1,444	2,824	29
Virginia (1)	12,276	5,332	16,380	472	28,285	22,844	195
Washington	3,922	1,987	28,208	1,301	28,141	17,360	115
West Virginia	1,601	2,531	10,441	1,018	33,188	30,068	252
Wisconsin	1,907	3,371	19,969	695	26,693	11,496	136
Wyoming	656	1,365	4,298	3	2,087	2,714	....
Total	763,003	363,771	1,096,638	45,570	2,499,927	1,230,188	18,738
Size of Community							
200– 500	31,477	14,616	183,923	5,902	160,477	103,229	266
500– 1,000	13,177	16,959	92,887	2,781	133,817	84,059	587
1,000– 5,000	19,317	52,216	180,513	3,843	307,352	249,502	1,828
5,000– 10,000	10,145	32,812	68,985	1,637	116,996	101,431	1,238
10,000– 25,000	14,563	36,722	99,766	2,006	120,921	114,643	1,930
25,000– 50,000	13,286	26,021	66,767	3,158	90,015	70,061	1,026
50,000–100,000	16,697	20,114	56,852	7,233	96,035	79,272	1,919
Over–100,000	644,341	164,311	346,945	19,010	1,474,314	427,991	9,944

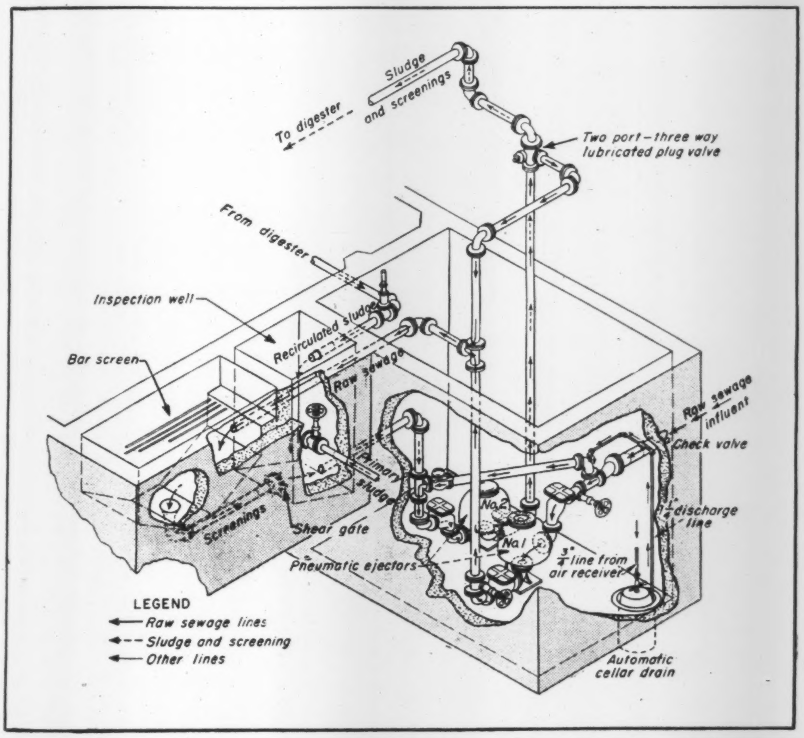
Pumping Can Be Simplified For Small Sewage Disposal Plants

William J. Wenzel
Consulting Engineer
Great Falls, Montana

***Contents in Brief**—Discouraging experience with the operation and maintenance of small sewage treatment plants prompted design of a "foolproof" pumping system. Prepared for Dutton, Montana when the author was chief engineer of Corwin & Co., Inc., this installation utilizes two air ejectors and a minimum of valves and piping. With it, raw sewage is pumped to primary settling tanks; screenings and primary sludge are passed separately to the digestor; and digestor contents are recirculated.*

EXPERIENCE with small communities uncovers some discouraging examples of indifference and neglect of sewage treatment plants. While no reflection is intended against the many hardworking, conscientious operators who do a good job in spite of lack of funds and difficulties, it is important to bear in mind, when designing a new plant, the possibility that at some time, because of vagaries of local politics and uncertainties of economics, the plant and its equipment may not receive the care originally intended.

Cynically speaking, an ideal sewage treatment plant for a small town would be a hole in the ground down which sewage disappears, never to be seen again.


Sludge
and screenings
To digester
Two port – three way
lubricated plug valve
From digester
Inspection well
Recirculated sludge
Bar screen
Raw sewage
Raw sewage
influent
Check valve
Primary
sludge
No.2
No.1
1¼" discharge
line
Screenings
Shear gate
Pneumatic ejectors
¾" line from
air receiver
LEGEND
Raw sewage lines
Sludge and screening
Other lines
Automatic
cellar drain

Two pneumatic ejectors fitted with inlet and outlet check valves, a two-port, three-way plug valve, and a system of piping provide a simple means of pumping sewage and sludge to various units of a small treatment plant.

Lacking such a convenient hole when the sewage treatment plant was designed for Dutton, Montana (population 600), and desiring a plant that would operate under unfavorable conditions, the design here described was evolved for pumping sewage and sludge.

What ejectors do

Pumping is handled entirely by two air-operated ejectors, which are closed cast-iron pots, each equipped with check valves on inlet and outlet pipes and connected to an air supply. As sewage enters, a float rises. When the float reaches its upper limits, a valve is tripped and air enters forcing sewage into the outlet pipe. These injectors handle several operations:

1. Pump raw sewage, from the incoming sewer approximately 10 ft. below ground to primary sedimentation tank at ground level.
2. Pump screenings from bar screen chamber into digester.
3. Pump sludge from primary tank into digester.
4. Recirculate digester contents by drawing sludge from bottom and pumping it into the top of digester.

Incoming sewage (35 gpm.) entering ejector No. 1, is pumped into the screen chamber, rises through the horizontal bar screen and flows into the primary tank, through an opening not shown in the accompanying illustration. The rated capacity of each ejector is 50 gpm. When raw sewage flow exceeds the capacity of one ejector, the excess enters ejector No. 2 and both ejectors with a total capacity 100 gpm. pump raw sewage.

Screenings from the bar screen chamber, sludge from the primary tank, and sludge from the digester (when recirculation is required) enter the concrete inspection well through manually-operated valves. To pump the contents of the hopper into the digester, the three-way lubricated plug valve shown above ejector No. 1 is turned to permit straight upward flow. This should be done before the hopper is filled.

The hopper contents then pass to ejector No. 2, which pumps them into the digester. When the hopper is empty, the plug valve is returned to the position and ejector No. 2 is ready to resume its duties as a second raw sewage pump. Any screenings or sludge remaining in the lines will re-enter the plant with the next batch of raw sewage handled by ejector No. 2 and will be screened or settled out in plant operation.

Advantages for small plants

This somewhat unorthodox arrangement has the several features which are particularly advantageous in a small plant:

1. All parts of the system will pass solids up to 4 in. in size.
2. No moving parts are in contact with sewage; no packing and stuffing boxes are included.
3. Being tightly sealed, ejectors do not permit escape of odor or gas.
4. No harm would result if the ejector pit was filled with ground water.
5. The only operating mechanism, an electrically driven rotary air compressor, is located on the main floor where it is easy to service.
6. In event of power failure or breakdown of the compressor unit, it is only necessary to connect a portable air compressor to the system and plant operation will continue.

Bids were taken in May, 1947 for construction of this plant, and the contract was awarded to the low bidder, Utility Builders Inc., Great Falls, Montana for the sum of $39,320. It is anticipated that this project will be in operation this fall.

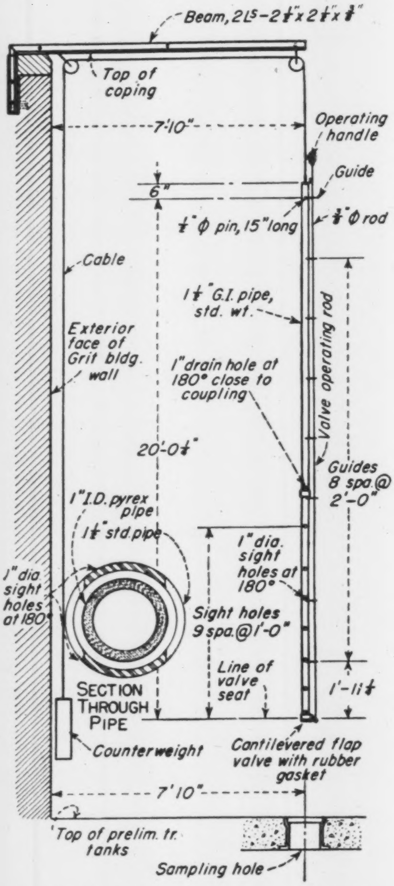
In this connection, it is of interest to note that a contract was awarded in Jan. 1946 for a plant identical in size and similar in design at Culbertson, Montana to Elmer Johnson, Glasgow, Montana. The contract price was $23,769, an increase in cost of 65 percent in 16 months.

Sludge Depth Indicator

James H. Blodgett
Superintendent of Sewage Disposal
Columbus, Ohio

As every sewage plant superintendent knows, accurate knowledge of the depth of sludge in primary settling tanks is essential to good operation. Unless this information is readily obtainable, employees are prone to guess rather than make the measurement.

At the Columbus, Ohio sewage treatment works, this procedure was laborious and time-consuming, and consequently, "questimates" were encouraged. The "last straw" occurred one day when I found an entry in the operating log showing a 2-ft. sludge depth in the primary tanks. But, within five minutes of the time of the entry was made, I had looked into the tank and found it completely dewatered for maintenance inspection. It was then decided to find a means of obtaining the sludge depth easily, quickly, and accurately.



The sludge depth indicator at the Columbus, Ohio treatment plant is made of a glass tube placed inside a galvanized iron pipe through which sight holes have been drilled at 12-in. spacings.

The measuring device shown in the accompanying illustration is the result of this effort. It consists of a glass tube inside a protective 1½-in. galvanized iron pipe through which 1-in. sight holes have been drilled at 12-in. intervals; an operating rod aligned by slotted guides welded on the pipe exterior and extending from the top of the pipe to the flap valve at the bottom; and a pin-hinged flap valve fitted with gaskets that closes against the bottom of the sampling tube. Also a snap catch used to hold the valve open is included at the top.

The assembled tube is suspended from a cable operating through two pulleys hung from a beam cantilevered from the coping and made up of two 2½x2½x⅜-in. angles. The beam is supported in a receptacle behind the coping that permits the assembly to be swung against the face of the building when not in use.

To determine sludge depth, the unit with the valve open is lowered slowly to the established datum through a small hole in the tank roof. Then the snap catch is released and the valve is closed by the weight of the operating rod. The rod is heavy enough to keep the valve closed tightly during removal.

After the indicator tube has been removed from the tank, the number of filled-in sight holes are counted and the depth of sludge determined. The tube is drained by raising the rod until the catch makes contact.

Because of unwieldiness, it was necessary to add a heavy counterweight as shown. Consequently, the next sludge depth indicator will be made of aluminum pipe to save weight, and sight holes will be drilled of 6-in. intervals for more accurate measurement.

Comment and Discussion

Readers' opinions on matters that concern engineers and contractors

Excessive Cost of Bridges

Sir: In 1941 two through-plate girder railroad bridges on a New York State grade crossing elimination project would have cost $301,000 using the average of contractor bid prices for that year. In 1947, at 1947 average bid prices the same project would cost $544,000. This increase of 81 percent over 1941 prices can not be justified by any kind of a breakdown that an engineer can make.

Over 50 percent of the cost of the above project is for reinforced concrete, an item which should have had the least increase in cost as the cost of aggregates certainly has not increased greatly over 1941 prices; yet in 1941 contractors offered to furnish concrete for less than $16 per cubic yd. while in 1947 they are asking $35 to $40. Reinforcing steel is paid for separately and does not affect the concrete cost directly. These prices per yard do not include cement which is also paid for separately and can be bought at a price of not over 20 percent above 1941 prices. On some recent New York State bids, steel prices varied from 10c. to 25c. a pound.

According to the *Engineering News-Record* issue of April 17, 1947 cement prices have increased 18 percent, steel 14 percent, skilled labor 27 percent, common labor 53 percent and equipment costs 53 percent over 1941 prices.

Using these prices and assuming on a bridge job that labor costs are 25 percent of the whole, equipment costs 25 percent and materials cost 50 percent, a breakdown would show that costs have increased exactly 35 percent over 1941 prices, which also includes an increased contractor profit of 35 percent.

All of this seems to indicate to designers and estimators that contractors prefer to make a lot of money by doing a little work at high prices rather than making their money by doing a lot of work at reasonable prices. In fact, this same attitude seems to have permeated all business and labor. The consumer can only go on a buyer's strike and I do not believe that New York State or any other public organization should do any construction at present prices.

Vere P. Maun
Castleton-on-Hudson, N. Y.

Digester Scum Control

Sir: The article on digester scum control by Frank L. Flood (*ENR* June 26, 1947, vol. p. 1008) brings to mind two schemes for this purpose which have been developed in this office in recent months. The first scheme is for the Ephrata, Wash., treatment plant, bids for which are now being called.

The Ephrata digesters are in the form of a cube, 20x20x20 ft., and have fixed concrete covers. The roofs are sloped upward toward the center and are topped by concrete gas domes 3 ft. square. The liquid level in the digesters will be maintained so that the surface is part way up in the 4-ft. high gas dome. Thus only 9 sq.ft. of liquid surface area is unsubmerged.

The recirculation pump will operate automatically to maintain a digester temperature of 85 deg. F. by passing sludge through a heat exchanger. This sludge will be discharged straight upward in the gas dome where it will impinge on a flat plate and fall on the exposed scum surface. This action is intended to keep the exposed scum wet, soft, and actively digesting.

New sludge from the clarifier is pumped automatically with the control on a time cycle basis. This sludge is mixed with seeded sludge through the simultaneous operation of the recirculation pump and the mixture is heated by passing through the exchanger before discharge as previously described.

Liquid levels are maintained automatically by means of supernatant selectors, the selector for the primary digester discharging over a riser and into the secondary digester and the selector for the secondary digester discharging into the raw sewage ahead of the clarifier. Provision is made for backflushing the selectors and for sludge transfer and discharge.

When the plant is put into operation, it will be necessary to adjust the time cycle control to pump raw sludge in the proper amount several times during the day in accord with the load on the plant. The recirculation thermal control will be set to maintain a temperature of about 85 deg. F. in the primary tank. Thereafter, sludge pumping and scum control will be entirely automatic except for relatively infrequent transfer and discharge operations.

A second method of scum control which is still in the idea stage is similar to that presented by Mr. Flood. Instead of having fixed jets, however, we are thinking of suspending a rotary arm in the digester with nozzles at the ends to cause rotation. This would not only break up the scum but would accomplish good distribution of sludge in the digester. Such an arrangement would be very similar to a rotary distributor on a trickling filter except that it would be submerged.

L. L. Sphar
Parker & Hill
Civil and Consulting Engineers
Seattle, Wash.

Inter-American Highway

Sir: May I be permitted to comment on the news item in *ENR* July 17, vol. p. 79, to the effect that again plans have been ordered to be prepared for the completion of the Inter-American Highway.

Four years ago you printed several articles, well written and informative, giving the status of work on this road, (then supposed to be rushing to completion as a war necessity) as observed by your staff writer A. N. Carter on an inspection tour of the route. It was indicated that 1945 would be the year of opening a through route from Mexico to the Panama Canal. Shortly afterward, Washington shut down the whole project, evidently thinking that as propaganda it was too costly and finally realizing that the war would not wait on the road which would have served no useful purpose in any case as is now recognized by the Senate Committee whose report seems to be in accord with the facts known to many during the war.

The concluding paragraphs of your news report indicate that, quite naturally, various of those in authority, concerned in the matter, have had their feelings hurt by the criticism of the Senate committee and now cite points in defense. Their unfavorable comment relates to the conclusion in the committee's report that a wrong choice was made between a mountainous location and a coastal route. To justify the original planning various factors are cited. They are correctly stated, but the matter is not quite so simple as is outlined.

The Public Roads Administration is not to blame for the fiasco of the wartime attempt to finish the road, although it is open to criticism for its choice of route in certain sections. The line, selected in accordance with policies described in its original report of 1934, was not intended to be a military line of communication from the United States to the Panama Canal, but to serve local interests primarily to give access to neighboring countries, and naturally followed the general course of such thoroughfares as had been used since pre-colonial days. This route was only partially in mountainous country. It crossed the elevated plateau of Guatemala and the lower populous coffee areas of El Salvador, descended to the Lempa valley near sea level, passed the low country of San Miguel, and skirting the Gulf of Fonseca through Honduras, followed the low plain of Leon to the lakes of Nicaragua at near sea-level through the densest population in that country, near the Pacific coast, a route described by Squiers and Stephens in the mid-Nineteenth Century.

The route is continued in Costa Rica part way around the Gulf of Nicoya to the vicinity of Puntarenas at Esparta, but here instead of reaching San Jose the capital by a branch road as is the case with Tegucigalpa, the main line departed from the coastal route, climbed east to the central plateaus and on to near Cartago. From here the route turns south, and makes an ascent of more than a mile vertically to a summit crossing of the Cordillera, then a side hill and winding descent with hairpin turns goes through an unpopulated forest and jungle region to the low country near the coast and on to the southeast to join the Panama national highway.

Thus there was no selection of a continuous mountain route, there being no continuous mountain chain, nor was a coastal route rejected because of stream crossings, there were numerous streams to cross and many large bridges were built along the route chosen.

In Nicaragua the line was later modified from that of the original report with its direct route through the populous regions along the line of the principal cities, to take an S bend, first past the hill country formerly held by Sandino during his revolutionary career, then crossing the other line from the Matagalpa road west to Managua and south over the hill country of Diriamba to join the other route near Rivas and the Costa Rican frontier. These changes which appreciably lengthened the road and increased the amount of heavy grading could not be attributed to any desire to pass through dense population, which it evaded, or to reach the capital, which was already on the other line, or to utilize an existing highway, which was by-passed, but only as a concession to local political interests.

When the Army Engineers took charge they abandoned the carefully selected route of the PRA in western Guatemala, claiming that it was too high to cross an elevated plateau at above 10,000 ft. while asserting that the area was perpetually enveloped in fog. They started on a line from the Mexican border near the coast and approximately parallel to the International Railways of Central America, which follows the route of the old Intercontinental Railway Commission survey of 1892, but they accepted without objection the climb to a still higher elevation in Costa Rica with its descent on the Pacific slope, with its steep grades and haripin turns like the road into the Yosemite valley. They also made no attempt in Nicaragua to revert to the shorter and more practical line along the railroad to the lakes.

As a matter of fact if, as was asserted in Washington in 1942, it was essential to the defense of the Panama Canal to have a land route of supply from the United States it might have been most practical and might have produced results in less time, to have extended the Mexican railway system (which in any case would have been essential for half the total distance to the canal) along the coastal route of the Intercontinental survey to Panama. The Mexicans were making no effort to complete their road to Guatemala, and without it ours would be useless as a supply line.

HENRY WELLES DURHAM
Sandwich, Mass.

Poor Footing Design Decried

Sir: I read "Wall Footing Action Poses Enigmas," by H. S. Woodward (*ENR* June 12, vol. p. 955), with much interest. However, it is not necessary to go all the way to Texas or Louisiana to find such footings as described. Examples are available in Portland or Oshkosh or anywhere else you happen to hail from.

I object to calling the use of such methods conventional, even though they are used in a large percentage of buildings. Furthermore, I don't feel that "time-consuming analyses and hiring of expensive consultants" is necessary for the solution of such a simple foundation problem. I do admit, however, that engineers and architects who should know better continue to build such structures as this.

In a recent law suit, an architect stated he had designed thirty-five buildings with such footings; therefore, it could not be inadequate footings that caused the building in question to fail. As a test, I asked one of the lawyers what he thought could be done to correct such a footing. His knowledge of engineering was that which he had learned in high-school physics, but he thought some steel from the wall into the footing might be the solution. He wouldn't venture an opinion as to the side of this wall in which the steel should be placed.

The point I am trying to bring out is that foundation engineering involves far more difficult problems than the design of such simple footings as those described by Mr. Woodward.

S. E. SPORSEEN
Sporseen Associates
Portland, Oregon

IF THE JOB IS IMPORTANT . . . THEY SPECIFY SCHRAMM

•

ANY TIME

•

ANY WHERE

•

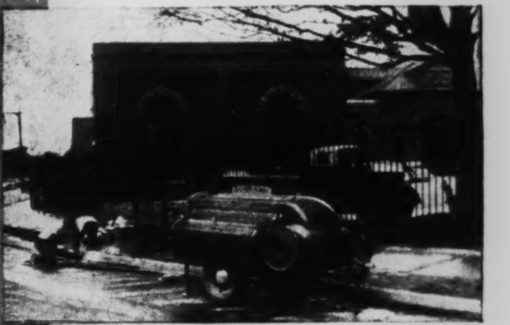
Here you see 7 construction jobs being furnished compressed air by Schramm Air Compressors. Every one of the jobs is tough . . . but easily handled by Schramm, who furnishes all the air needed.

Throughout the country you will find Schramm Compressors used in construction work, specified because they are versatile, compact, lightweight. Schramm offers many advanced features. For full details write us today.

SCHRAMM INC.

THE COMPRESSOR PEOPLE

WEST CHESTER • PENNSYLVANIA



UNIT PRICES BID BY CONTRACTOR

Little Red River Bridges, Arkansas

OWNER: Arkansas State Highway Commission, Little Rock, Arkansas; W. W. Zass, Engineer.

PROJECT: Construction of one reinforced concrete and structural steel cantilever deck plate girder bridge approximately 413.5 ft. in length and one reinforced concrete and structural steel I-beam bridge approximately 398.0 ft. in length on the Searcy—Judsonia Road, White County, Arkansas. The proposed bridges are located over Little Red River and Little Red River relief.

CONDITIONS: No materials will be furnished by the owner. Access to job site is available by Missouri Pacific Railway and Highway 67. Stipulated contract time is 230 working days. Skilled labor wage rate is $1.00 per hr.; semi-skilled, $.72 per hr.; and common, $.62 per hr.

BIDS: Two bids were received, the contract low of $269,824.90 and $310,115. Contract was awarded June 9, 1947.

LIST OF BIDDERS:

1. Massman Const. Co., Kansas City, Mo. (contract)	$269,824.90
2. Forcum-James Co., Memphis, Tenn.	310,115.00

Item	Quantity	Unit Prices (1)	Unit Prices (2)
1 Clearing	0.73 a	$350.00	$200.00
2 Dry excavation for structures	804 cy	4.00	4.00
3 Wet excavation for structures	1,330 cy	24.00	24.00
4 Solid rock excavation for structures	52 cy	16.00	25.00
5 Class "A" concrete for bridges	951.2 cy	40.00	40.00
6 Class "S" concrete for bridges	810.6 cy	45.00	60.00
7 Seal concrete for bridges	380.8 cy	23.00	25.00
8 Reinforcing steel	240,150 lb	.10	.09
9 Concrete piling—14" sq	1,450 lf	6.00	9.50
10 Concrete piling—(16" octagonal)	1,965 lf	6.00	10.00
11 Concrete railing	836.5 lf	4.00	11.00
12 Concrete and struct. steel rail	822.5 lf	7.50	12.00
13 Struct. steel in beam spans	663,810 lb	.125	.14
14 Untreated timber piling	5,304 lf	1.75	1.40
15 Riprap	530 cy	8.00	16.00
16 Bridge name plates Type "A"	4 ea	50.00	25.00

Relaying Combined Sewers, Milwaukee, Wisconsin

OWNER: City of Milwaukee, Wisconsin; J. P. Schwada, City Engineer.

PROJECT: Relaying of sewers in the same location as old sewers which are to be removed. All existing house sewers to be reconnected to new sewer. All vitrified clay pipe to be used. Manholes of concrete blocks, inside D3'-6". Average depths of sewers are as follows: for 18" sewer, 9.5 ft.; for 21", 12.0 ft.; for 27", 16.0 ft.; for 30", 16.5 ft.; and for 36", 15.0 ft. Sand backfill for all trenches and macadam pavement in street.

CONDITIONS: Ground conditions expected for the first 11 ft., dry filling; for next 3 ft., soft sandy clay (wet); and for the next 3 ft., peat (dry). No materials will be furnished by the owner. Access to job site is available by rail and highway. Stipulated contract time is 60 calendar days. Skilled labor wage rate ranges from $1.85 to $2.15 per hr. Semi-skilled rate is $1.65 per hr.; common rate is $1.45.

BIDS: Three bids were received June 26, 1947, ranging from the contract low of $45,363.75 to $45,580.00.

LIST OF BIDDERS:

1. R. W. Const. Co., Milwaukee, Wis. (contract)	$45,363.75
2. L. and L. Service Co., Milwaukee, Wis.	45,554.00
3. Tomaro, Carle and Tomasini	45,580.00

Item	Quantity	Unit Prices (1)	Unit Prices (2)	Unit Prices (3)
1 House sewers and drains	250 lf	$9.00	$6.00	$8.00
2 Sewer 0–2, 18 in.	134 ea	21.50	21.00	18.00
3 Sewer 0–3, 18 in.	85 ea	23.75	22.00	22.00
4 Sewer tunnel. 0–4, 18 in	68 lf	39.25	39.00	36.00
5 Sewer 0–2, 21 in.	160 ea	22.50	22.00	20.00
6 Sewer tunnel, 21 in	195 lf	39.00	40.00	39.00
7 Sewer, 27 in.	322 lf	25.50	28.50	37.00
8 Sewer, 30 in.	61 lf	28.00	30.00	38.00
9 Sewer tunnel 0–4, 36 in.	53 lf	47.00	48.00	46.00
10 Sewer, 0–3, 36 in.	132 lf	32.50	33.00	39.00
11 Sewer 0–2, 36 in.	136 lf	28.75	31.00	32.00
12 D manhole with OD conn	1 ea	400.00	350.00	300.00
13 Manhole	1 ea	400.00	400.00	300.00
14 Manhole with OD conn	1 ea	350.00	325.00	275.00
15 Underpin, manholes	2 ea	200.00	125.00	175.00
16 Underpin, manholes const., OD conn	2 ea	250.00	225.00	225.00
17 Manholes	6 ea	280.00	250.00	200.00

Concrete Pavement and Bridge Over Angelico Creek, Virginia

OWNER: Department of Highways, Richmond, Virginia.

PROJECT: Construction of 8.488 miles of 24'x9" reinforced cement concrete pavement and bridge over the Angelico Creek in Virginia. The pavement and bridge are to extend from 7.880 miles west of Courtland to 16.368 miles west of Courtland. The bridge is to consist of 3 25 ft. reinforced concrete spans, 82 ft. 6 in. long with a 28 ft. roadway.

CONDITIONS: Access to job site is available by rail and highway. Completion of job is set for June, 1948. Prevailing skilled wage rates range from $1.50 to $2.00 per hr. and common from $.75 to $1.00 per hr. Semi-skilled wage rates are $1.00 or more per hr.

BIDS: Six bids were received, ranging from the contract low of $590,915.28 to $688,296.26. Contract was awarded June 18, 1947.

LIST OF BIDDERS:

1. Rea Const. Co., Charlotte, N. C. (contract)	$590,915.28
2. Hechler Bros., Richmond, Va.	606,258.70
3. W. H. Scott, Inc., Franklin, Va.	638,941.58
4. E. W. Grannis Co. and Ballenger Pav. Co., Fayetteville, N. C.	651,060.56
5. Williams Paving Co., Norfolk, Va.	651,859.35
6. Bero Engr. and Const. Corp., Hampton, Va.	688,296.26

Item	Quantity	Unit Prices (1)	Unit Prices (2)	Unit Prices (3)
1 Clearing and grubbing	24 a	$300.00	$300.00	$400.00
2 Regular excavation	263,190 cy	.32	.28	.30
3 Borrow excavation	16,437 cy	.32	.35	.30
4 Concrete, class "A"	346 cy	50.00	47.50	60.00
5 Concrete, class "C"	64 cy	45.00	40.00	60.00
6 Metal reinforcement	30,134 lb	.09	.09	.10
7 Concrete R. of W. monuments	65 ea	3.00	2.50	4.00
8 Pipe under-drains—6 in	23,341 lf	.75	1.00	.90
9 Sub-grade under-drains—CD1 or CD2	2,092 lf	.80	.80	.90
10 Concrete pipe—15 in.	1,026 lf	2.25	2.20	2.50

(*Continued on page* 117)

Concrete Pavement and Bridge Over Angelico Creek, Virginia

(*Continued from page* 114)

11 Concrete pipe—18 in	291 lf	2.75	2.80	3.50
12 Pipe (3000-d)—15 in	108 lf	3.00	2.50	3.00
13 Pipe (3000-d)—24 in	102 lf	4.25	4.80	5.00
14 Pipe (extensions)—15 in	273 lf	2.25	2.20	3.00
15 Pipe (extensions)—18 in	162 lf	2.75	2.80	3.50
16 Pipe (extensions)—24 in	444 lf	4.00	4.50	5.00
17 Pipe (relaid)	442 lf	3.00	2.50	5.00
18 W. i. pipe	39 lf	5.00	2.00	6.00
19 Concrete class "B"	137 cy	48.00	50.00	60.00
20 Timber piling (untreated)	1,500 lf	1.75	1.25	1.20
21 R/W monuments (reset)	44 ea	2.00	2.00	2.00
22 F. A. project marker	1 ea	5.00	5.00	6.00
23 F. A. & state project marker (reset)	1 ea	5.00	2.50	2.00
24 State project marker	1 ea	5.00	5.00	6.00
25 Soil (entr's. (4")	433 cy	2.20	2.50	6.00
26 Soil (6")	1,200 cy	2.10	2.50	6.00
27 Soil (10")	745 cy	2.00	2.50	6.00
28 Reinf. cem. conc. pave. (9")	119,877 sy	3.14	3.26	3.19
29 Subgrade material	48,629 cy	.60	.75	1.00
30 Bituminous material	8,237 gal	.15	.16	.25
31 Covering material	297 tons	5.00	5.00	5.00
Superstructure				
32 Concrete, class "A"	108.4 cy	55.00	52.50	75.00
33 Reinforcing steel	25,670 lb	.09	.09	.10
Substructure				
34 Concrete, class "A"	93.4 cy	50.00	52.50	75.00
35 Reinforcing steel	6,940 lb	.09	.09	.10
36 Concrete slab, rip rap	424 sy	5.00	4.50	4.00
37 Excavation class "A"	190 cy	5.00	5.00	10.00
38 Excavation, class "B"	54 cy	20.00	20.00	10.00
39 Piles (treated)	800 lf	3.00	2.00	2.50
40 Piles (untreated)	600 lf	1.75	1.25	1.20

Improvements at Toledo Municipal Airport, Ohio

OWNER: Department of Public Service, Toledo, Ohio; John H. Jewhurst, Director; C. L. Piper, City Engineer.

PROJECT: Improvements being constructed consist of 150 ft. x 750 ft. eight in. concrete apron, together with 50 ft. of 8 in. taxiway parallel, 25 ft. taxiways serving the Fixed Base operators, southeast of the landing apron, and the access roadways and parking areas. Also included in this contract is a sanitary sewer system consisting of wet well dosage chambers and filter beds and a 500 ft. deep, well water system. Drainage being constructed consists of an independent system of storm drainage outflow at the east side of field. Sub-surface drainage being constructed along edges of paved areas including roadways, apron and taxiways consists of 6 in. corrugated, perforated, asphalt dipped, steel pipe at an average depth of 2 ft. 7 in. placed 2 ft. outside of the edge of the paved areas. The concrete apron and taxiways are reinforced with 69 lb. reinforcing mesh. All joint material is of the thermoplastic type.

CONDITIONS: All materials to be furnished by the contractor. Access to job is available by rail and highway. Date for completion of the contract is November 15, 1947. The approximate wage rates are $2.25 per hr. for skilled labor; $1.625 per hr. for semi-skilled; $1.425 per hr. for common labor on buildings; and $1.20 per hr. for common labor on pavement.

BIDS: Three bids were received, ranging from $324,544.10 to $353,346.80. The contract was awarded July 7, 1947.

LIST OF BIDDERS:

1. Launder and Son, Toledo, Ohio (contract)	$324,544.10
2. George Trombley and Sons, Toledo, Ohio	327,363.30
3. S. E. Johnson Co., Toledo, Ohio	353,346.80

		Unit Prices		
Item	Quantity	(1)	(2)	(3)
1 Excavation, unclassified	16,480 cy	$0.70	$0.90	$1.25
2 Granular material for sub-base	4,260 cy	3.80	4.50	6.60
3 150′ Land. apron—8" reinf. conc. cl. "A"	12,477 sy	4.17	3.40	4.30
4 50′ Taxiways—8" reinf. conc. class "A"	16,250 sy	4.17	3.40	4.30
5 25′ Taxiways—7"-5"-7" reinf. conc. cl. "A"	960 sy	3.79	2.80	3.65
6 24′ Entrance driveway 9"-6"-9" reinf. conc. class "D"	4,260 sy	3.62	3.15	3.85
7 20′ Driveway 9"-6"-9" reinf. conc. class "D"	2,740 sy	3.62	3.20	3.
8 2½" Asphaltic conc. wearing surf. 25′—F.B.O. taxiways	375 cy	13.85	14.50	13.00
9 2½" Asphaltic conc. wearing surf. for auto parking space	476 cy	13.85	14.50	13.00
10 Water bound macadam base for F.B.O. taxiways and auto parking space—5"	1,680 cy	7.45	7.50	7.50
11 Conc. walks in front of Admin. Bldg. class "C"—6"	19,460 sf	48	40	.45
12 Conc. platforms at Admin. Bldg. class "C"—6"	1,980 sf	48	53	.45
13 Conc. curb at Admin. Bldg. class "D"—6" x 16"	240 lf	2.00	1.50	1.35
14 Chainlink fence incl. gates with steel posts set in conc.—48"	571 lf	2.12	2.10	2.40
15 Reinf. conc. sewer pipe or corr. iron pipe with paved invert—15"	400 lf	3.12	4.50	3.65
16 Plain conc. sewer pipe or corr. iron pipe with paved invert—15"	1,400 lf	1.98	3.15	2.50
1 Reinf. conc. sewer pipe or corr. iron pipe with paved invert—12"	1,060 lf	2.34	3.35	2.80
18 Plain conc. sewer pipe or corr. iron pipe with paved invert—12"	1,472 lf	1.62	2.50	1.90
19 Reinf. conc. sewer pipe or corr. iron pipe with paved invert—10"	910 f	2.10	3.10	2.35
20 Corr. met. perf. drain pipe—6"	14,140 lf	2.10	2.25	2.20
21 Special manhole (aver. depth 5.5′)	32 ea	150.00	150.00	150.00
22 Elec. manhole (in 6" walk at apron)	5 ea	175.00	300.00	175.00
23 Special catch basin	22 ea	150.00	150.00	150.00
24 Metal underground ducts at landing apron—¾	1,060 lf	.98	1.25	.45
25 Underground ducts—2"	1,890 lf	1.04	1.50	.75
26 Underground ducts—3"	3,530 lf	1.12	1.60	1.10
27 Conc. post for apron light unit class "C".	10 ea	20.00	81.00	40.00
28 Conc. base for telephone gate station class "C"	5 ea	30.00	60.00	40.00
29 Sod-salvaged, stored and relaid	4,200 sy	5.0	3.00	.45
30 Tiedown in apron, type "A"	30 ea	3.00	15.00	10.00
31 Tiedown in apron, type "B"	24 ea	12.00	30.00	10.00
32 Water system installed complete	lump sum	18,117.00	17,750.00	20,148.70
33 Sanitary sewer system installed complete.	lump sum	31,948.00	35,000.00	33,492.80
34 Adjust CB and MH to meet grade	10 lf	25.00	50.00	25.00

Gravel Base Road, West Memphis, Ark.

OWNER: Arkansas State Highway Commission, Little Rock, Arkansas; W. W. Zass, Engineer.

PROJECT: Construction of approximately 4.760 miles of grading, minor drainage structures and gravel base course on the West Memphis—Marion Road in Crittenden County, Arkansas. The proposed project begins approximately ¼ mile north of the junction of Highways No. 61 and 70 at West Memphis and extends along present Highway No. 61 to the junction of Highways No. 61 and 64 at Marion.

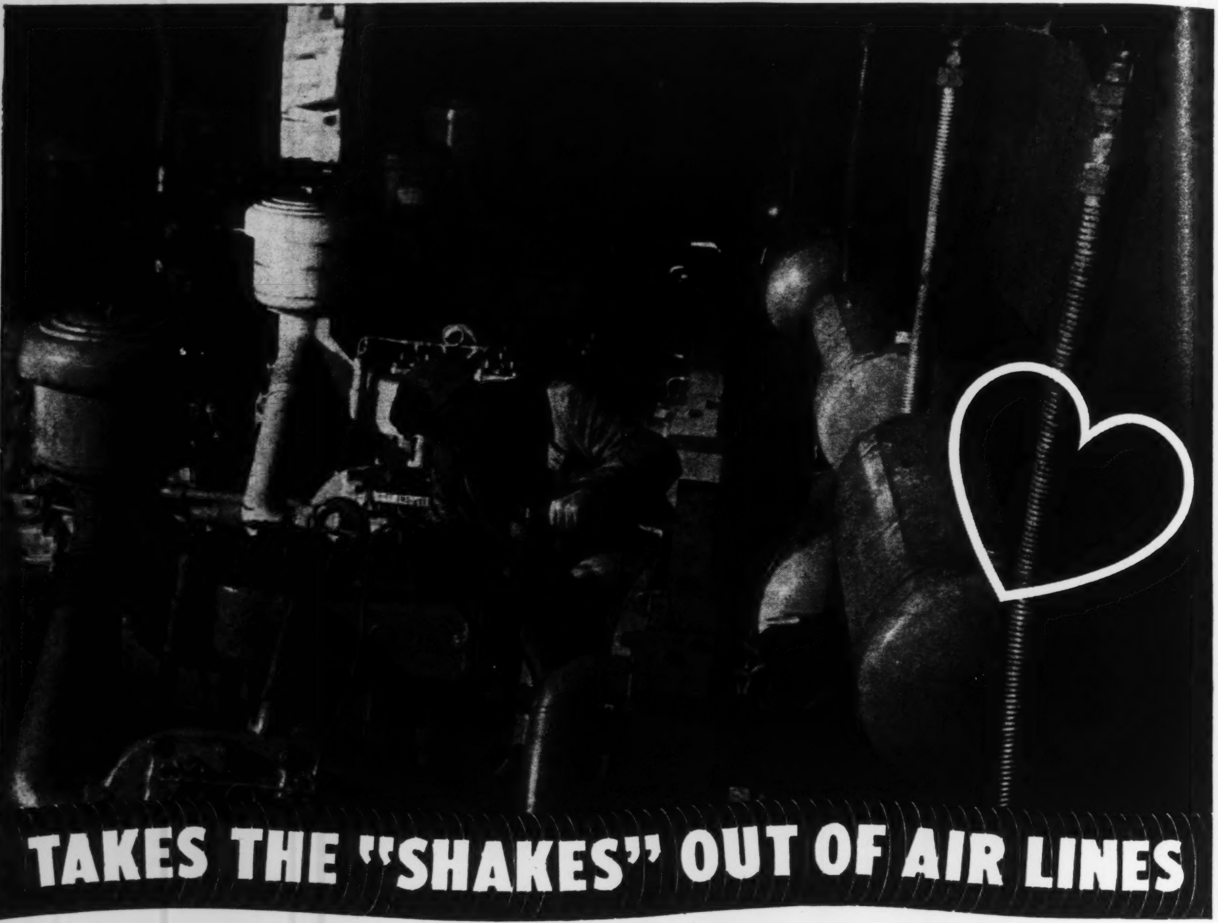
CONDITIONS: All materials are to be furnished by the contractor. Access to job is available by Missouri Pacific Railway, Highway 70 and Mississippi River. Stipulated contract time is 90 working days. Specified wage rates are $1.00 per hr. for skilled labor; $.72 per hr. for semi-skilled; and $.62 per hr. for common.

BIDS: Six bids were received, ranging from $47,995.98 to $60,281.14 Contract was awarded June 6, 1947.

LIST OF BIDDERS:

1. D. F. Jones Const. Co., Little Rock, Ark. (contract)	$47,995.98
2. J. P. McNulty, Pine Bluff, Ark.	49,355.44
3. Campbell Const. Co., Inc., Little Rock, Ark	51,161.10
4. Graves Bros., Hamburg, Ark.	52,341.94
5. Mears Const. Co., Osceola, Ark.	54,829.04
6. Linwood Smith, Lake Village, Ark.	60,281.14

		Unit Prices		
Item	Quantity	(1)	(2)	(3)
1 Common excavation	14,021 cy	$0.50	$0.30	$0.40
2 Dry excavation	214 cy	3.00	4.00	2.25
3 Overhaul	16,527 sta. yd.	.02	.02	.02
4 Fence moved and reconstructed	64 rods	1.00	2.00	1.25
5 Selected material	11,895 cy	1.10	1.00	1.30
6 Gravel base course class B2	9,222 cy	2.47	3.00	2.68
7 Class B concrete	13.82 cy	45.00	60.00	50.00
8 Reinforcing steel	382 lb	.10	20	.10
9 Corr. metal pipe culv.—18"	180 lf	2.75	3.00	2.80
10 Corr. metal pipe culv.—24"	440 lf	4.00	4.00	4.50
11 Corr. metal pipe culv.—30"	120 lf	5.50	4.65	6.00
12 Reinforced conc. pipe culv.—18"	24 lf	3.00	4.25	4.50
13 Reinforced conc. pipe culv.—36"	40 lf	7.50	6.50	8.00
14 Relayng culvert pipe	119 lf	2.00	2.00	2.00



TAKES THE "SHAKES" OUT OF AIR LINES

Penflex Flexible Metallic Hose prevents vibrations on compressed air lines, easily . . . safely . . . economically

With a mighty roar, 15 diesel-powered air compressors pump a steady air supply for air tools and equipment used on a world-known project. During the installation of these powerful compressor units, a method was required to prevent constant vibration from being transmitted to the rigid air lines.

That's where Penflex "Flexineering" service paid off. By using 3" Penflex interlocked flexible metal hose as connectors between compressors and pipe lines, the "shakes" are eliminated. Tight as a pipe, but flexible, Penflex hose "soaks up" constant vibration, assuring smooth air power . . . leak-proof, low-cost service. Penflex hose is also used to carry off obnoxious diesel exhaust, preventing dangerous leaks and vibration.

When your plant is troubled with flexible tubing problems, whether they pertain to production, maintenance or high operating costs, let Penflex "Flexineering" find the right answer. As America's oldest manufacturer of flexible hose, Penflex offers helpful layout-design service on flexible tubing applications to all industries. For flexible metallic hose, tubing, or couplings from 1/8" I.D. and up . . . for handy, time-saving automatic barrel fillers and pneumatic rivet passers . . . for the finest in engineering service, call on Penflex. Write today, to . . .

PENFLEX SALES COMPANY

Division of

PENNSYLVANIA FLEXIBLE METALLIC TUBING COMPANY

7211 Powers Lane Philadelphia 42, Pa.

BRANCH SALES OFFICES—BOSTON • NEW YORK • SYRACUSE • CLEVELAND • CHICAGO • HOUSTON • LOS ANGELES

Penflex . . . HEART OF INDUSTRY'S LIFE LINES

Copyright 1947—Penflex Sales Co.

New Aids to the Constructor

MANUFACTURERS' LATEST DEVELOPMENTS IN EQUIPMENT AND MATERIALS

TRACTOR-SCRAPER COMBINATION—Something new in earthmoving equipment is the "Moto- Scraper", a high speed tractor-scraper combination consisting of a 2-wheeled rubber-tired tractor joined to a 17.5 yd. scraper by a pedestal hitch assembly to form a single integral self-propelled unit. It is designed for digging, loading, transporting and spreading earth and other material on either long or short hauls. The tractor is equipped with a 225 hp. diesel engine and extra large 21:00 x 29 tires. It has four speeds forward and one reverse. Tractor has fuel capacity of 104 gal., enough for 12 or 15 hours operation—*LaPlant Choate Mfgr. Co., Cedar Rapids, Iowa.*

CLEANING COMPOUND—A new industrial cleaning compound, Kelite 555, is a fast and safe degreaser having penetrating and softening properties that remove carbon deposits by cold immersion. It is recommended for all metals and is especially efficient in cleaning automotive and diesel engine parts, fuel pumps, carburetors, filter screens, shock absorbers and brake parts. Containing no phenolic compounds, the product has a high flash point and is completely safe for the operator.—*Kelite Products, Inc., Los Angeles, Calif.*

ROAD GRADER GAUGE—Fitted to any standard road grader, this new gauge will fine grade to any desired depth without interfering with other operations of grader. Easily attached and removed, it can be changed from one width lane to another in few minutes. — *Road Grader Gauge Corp., Equitable Trust Bldg., Wilmington, Del.*

PNEUMATIC CONCRETE INJECTOR—Machine is now available by which various kinds of cementatious or inert grout compositions, even coarse aggregate concrete, can be placed by pneumatic injection, with greatly reduced water ratios.—*Prehy Co., Graybar Bldg., New York 17, N. Y.*

AIR DIFFUSION TUBE—A new type of air diffusion tube for use in the activated sludge process of sewage treatment and in air diffusion and gas mixing for the chemical process industries is announced by the Chicago Pump Co. The tube, made of corrugated stainless steel and mechanically wound with Saran plastic cord, is 60% lighter than previous diffusion media. Advantages of the "Precision" Tube are listed as: Thin-wall construction (1/6th of previous tubes) reduces depth-clogging and provides for quicker and more effective cleaning; precise uniformity of fine-bubbled diffusion from entire active surface of the diffuser at all air-rates; lower head loss at all air-rates; greater surface area of tube diffusing at all rates . . . entire surface active at maximum rates; cleaned tubes restored to original performance, i.e., no progressive clogging. Bulletin of technical data may be had on request.—*Chicago Pump Co., Wolfram Street, Chicago 18, Ill.*

ELECTRIC CALCULATOR—The R. C. Allen 10-key calculator is unusually compact, yet designed to solve the most complex problems in addition, subtraction, multiplication and division. No trained operator or extensive knowledge of mathematics is necessary. Features are fast multiplication with automatic spacing to the left or right; automatic division; and speedy subtraction and addition. Visible dials show all three problem factors in the line of vision. Each problem is proved as it is computed.—*R. C. Allen Business Machines, Inc., 678 Front Ave., N. W. Grand Rapids 4, Mich.*

ELECTRODES—Two new steel electrodes called "Low Temperature" EutecTrodes 66 AC and 660 DC, for arc welding steel at low base metal heat have been developed. They are flux-coated universal electrodes for superior welding of all types of steel producing a smooth, high tensile, crack-resistant weld, and particularly suitable for vertical position welding. For welding low carbon steel to high carbon, EutecTrode 66 can be successfully used. Being a universal rod for all types of steel, it eliminates the necessity for determining the base metal before welding. Preheating is unnecessary. The electrode is available in sizes 3/16, 5/32, ⅛, and 3/32 in. dia.—*Eutectic Welding Alloys Corp., 40 Worth St., New York 13, N. Y.*

GAS FIRED FORCED AIR FURNACE—The Palmaire gas fired forced air furnace, compactly designed for the average home where ducts are used for warm air distribution, features an all-steel, press-formed, streamline cabinet

HELTZEL
STEEL FORMS
FOR BUILDING CONCRETE CURBS,
CURB AND GUTTER OR SIDEWALKS

CONCENTRATED
Engineering
IN CONCRETE
CONSTRUCTION
EQUIPMENT

Rigid, self-interlocking HELTZEL STEEL FORMS make the setting and stripping job much easier and faster. No warping, no chipping, no replacements.

No matter how complicated or individual your specifications, Heltzel can furnish forms for your work. Standard Heltzel forms include: Lip Curb; Header; Integral Curb; Curb and Gutter; Rigid Radius or Flexible; Dowel Joint Curb; Highway and Airport Forms.

Engineering Data Mailed Promptly

Heltzel Steel Form & Iron Company, Warren, Ohio
Send me the following:

[ ] B-19 Steel Highway and Airport Forms
[ ] B-19A Steel Dual Duty Airport Forms
[ ] A-20 Steel Forms for Curbs or Curb and Gutters or Sidewalks.

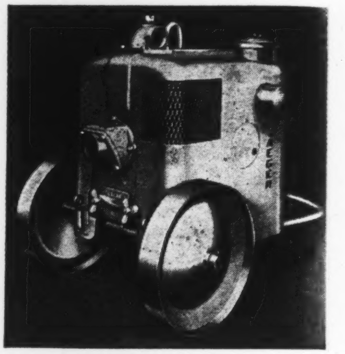
Name ____________
Address ____________
City ____________ State ____________
(Type of construction usually engaged in)

Heltzel
BUILDS IT BETTER

- BINS, Portable and Stationary
- CEMENT BINS, Portable and Stationary
- CENTRAL MIXING PLANTS
- BATCHERS (for batch trucks or truck mixers with automatic dial or beam scale)
- BITUMINOUS PAVING FORMS
- ROAD FORMS (with lip curb and integral curb attachments)
- CURB FORMS
- CURB AND GUTTER FORMS
- SIDEWALK FORMS
- SEWER AND TUNNEL FORMS
- CONCRETE BUCKETS
- SUBGRADE TESTERS
- SUBGRADE PLANERS
- TOOL BOXES
- FINISHING TOOLS FOR CONCRETE ROADS

HELTZEL STEEL FORM & IRON CO.
WARREN, OHIO · U. S. A.

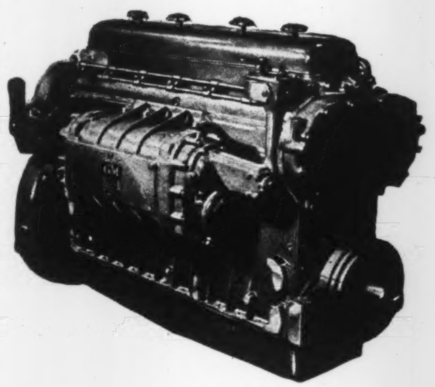
with silent corrugated steel lining, heavy gauge die-formed steel elements, baked enamel steel burners, automatic controls, spun glass air filter, 1,000 cfm. blower and a Hammertone blue, baked enamel finish with chrome trim. Powered by a heavy duty motor, the model has an approximate 80,000 BTU input. Natural, LPG, or manufactured gas can be used. All controls are located in the front. Thermostatic equipment is supplied with all sizes. —*Palmer Manufacturing Corp., Phoenix, Ariz.*

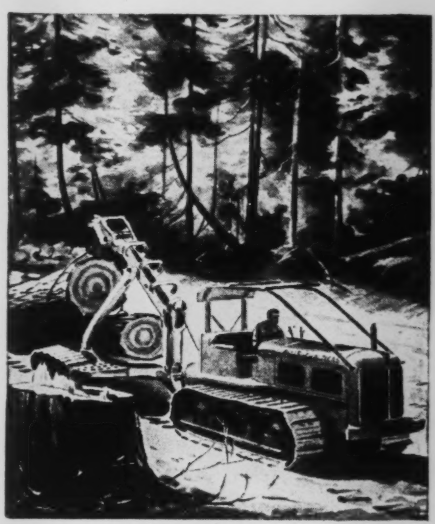


SELF-PRIMING PUMP — Overall housings protect this self-priming centrifugal pump and its engine from weather and dirt. Water is kept from spark-plugs, carburetor and crankcase. This insures quick starting and more efficient operation. Side panels give instant access to all operating controls—*Jaeger Machine Co., Columbus, Ohio.*

RECORDING INSTRUMENTS—New recording thermometers and recording gages, known as the Series 500 line, in 8 and 12 in. sizes, are housed in a modern case and incorporate many design improvements to make them easier to use, more convenient to service, and readily convertible from one type to another. The case is designed so it can be mounted either on a wall, front of panel, or flush on a panel and can be converted from one type of mounting to another. Other case features include a heavy inlaid sponge-rubber door gasket, flush roll-type door handle, and non-projecting door hinges.—*The Bristol Co., Waterbury 91, Conn.*

LUBRICATING GREASE—A lubricating grease for open gears and bearings, named Lead-Lube, is said to be the closest approach to a permanent lubricating medium which has been achieved. The product is a mixture of extremely fine metallic lead powder, and high grade lubricating grease. After a period of use, Lead-Lube will form a coating of metallic lead over all gear and bearing surfaces. When





a Smooth Powerful Pull—

because—

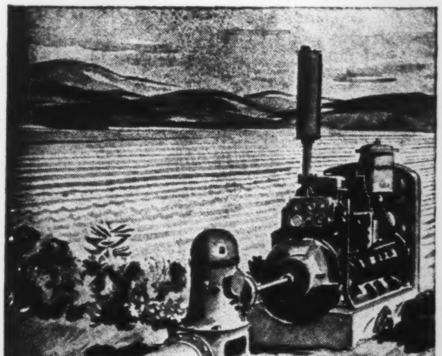
There's power at every downstroke!

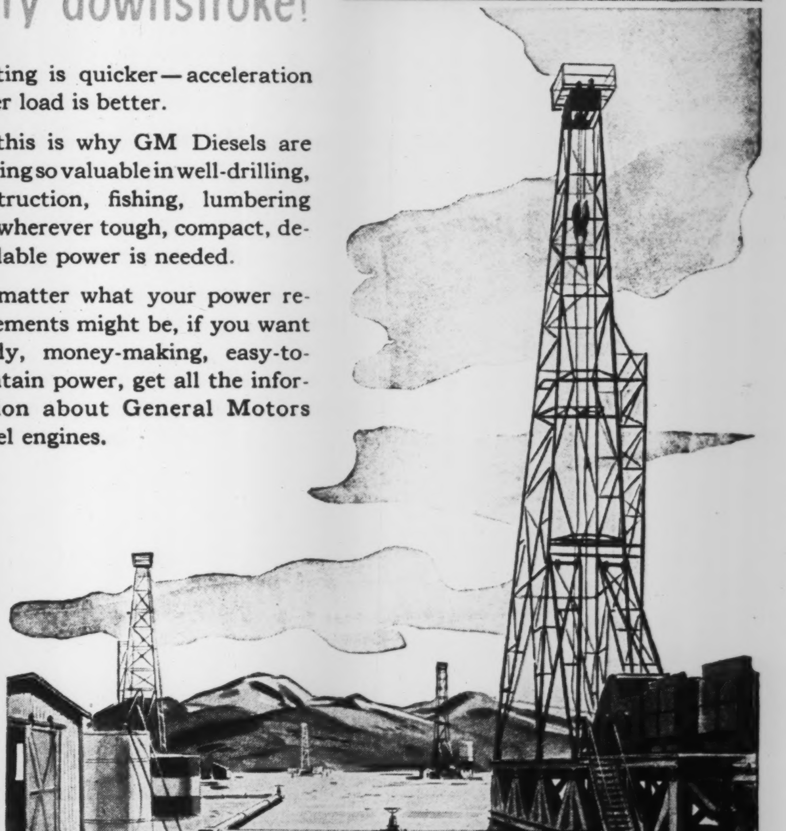
Is yours one of the many industries where power must be smooth and steady—where even the life and worth of the driven equipment depends upon the constant regular pull of the engine?

Such smooth and steady pull is an outstanding characteristic of the General Motors Diesel engine. It is the result of this engine's 2-cycle operation with power at every downstroke. Each piston pushes with each turn of the crankshaft. Starting is quicker—acceleration under load is better.

All this is why GM Diesels are proving so valuable in well-drilling, construction, fishing, lumbering and wherever tough, compact, dependable power is needed.

No matter what your power requirements might be, if you want sturdy, money-making, easy-to-maintain power, get all the information about General Motors Diesel engines.





DETROIT DIESEL ENGINE DIVISION

DETROIT 23, MICH. • { SINGLE ENGINES .. Up to 200 H.P.
MULTIPLE UNITS .. Up to 800 H.P.

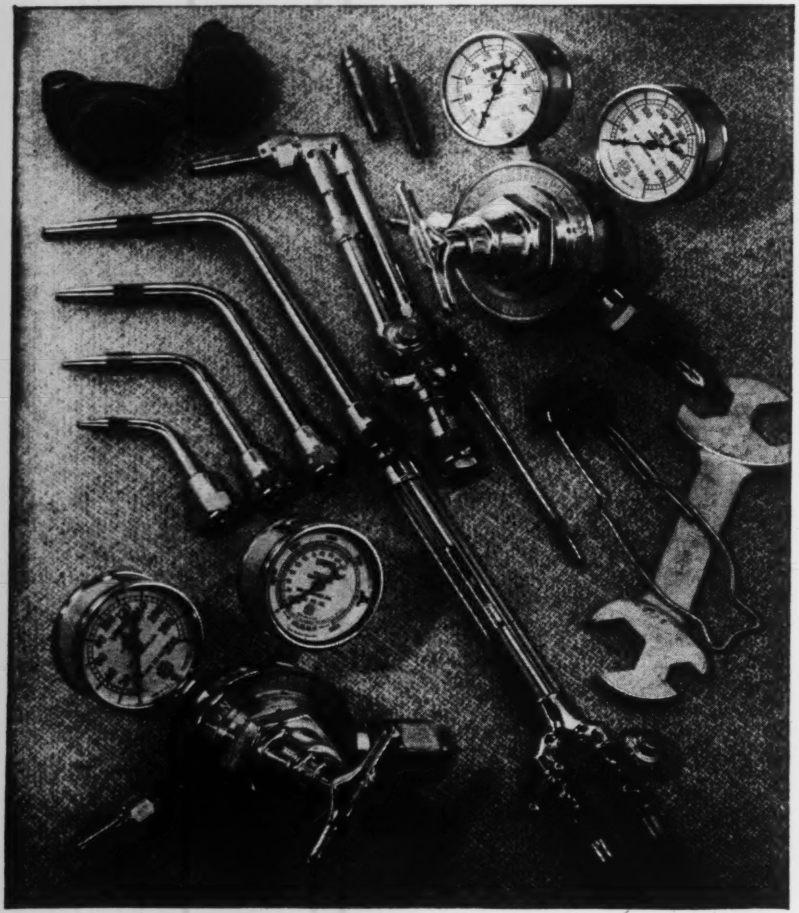
GENERAL MOTORS

GM
GENERAL MOTORS
DIESEL POWER

DIESEL BRAWN WITHOUT THE BULK

here is beauty

that is more than skin deep



here is the beauty of fine design and excellent craftsmanship which assure true ownership economy.

on the construction job, particularly, a good gas welding and flame cutting outfit is a necessity. on a construction job, however, such an outfit is used largely for emergency repair, for hard facing, for silver brazing and for flame cutting—such an outfit, therefore, must be dependable . . . on the job when needed. and—that quality is one of the numerous reasons why victor welding and cutting equipment is today the most popular and one of the most highly regarded in industry.

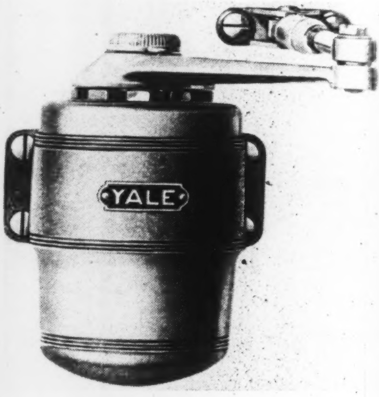
VICTOR EQUIPMENT COMPANY

san francisco **los angeles**

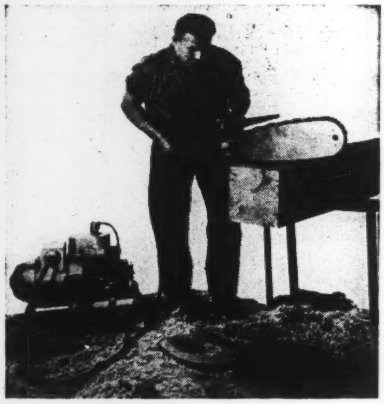
victor distributors from coast to coast

Ad 190

this lead coating is formed, the requirements for additional grease will have been reduced to an absolute minimum. —*Knapp Mills, Inc., 121 Broad St., New York, N. Y.*



DOOR CLOSER—This new door closer is more than a third smaller than conventional surface closers, but it has a powerful, flat-ribbon clock-type spring, which, aided by the leverage of the arms, automatically closes the door. Its rotary piston, turning on the axis of the shaft against the checking oil, controls the door throughout the full closing swing, the speed being regulated by the flow of oil through the ports of adual valve. It is noiseless.—*Yale & Towne Mfgr. Co., Chrysler Bldg., New York 17, N. Y.*



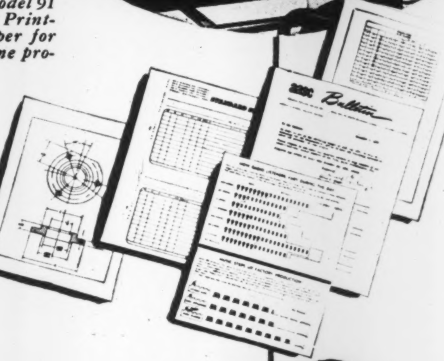
ONE-MAN CHAIN SAW—A new one-man, high-cycle electric chain saw weighs only 27 pounds, complete. It is easily handled by one man. Its small size and light weight permit this saw to be used in a tree for limbing—or in other locations inaccessible to bulkier or heavier saws, for cuts at any angle. Electric power is furnished by a Homelite High-Cycle generator driven by an integral gasoline engine.—*Homelite Corp., Port Chester, N. Y.*

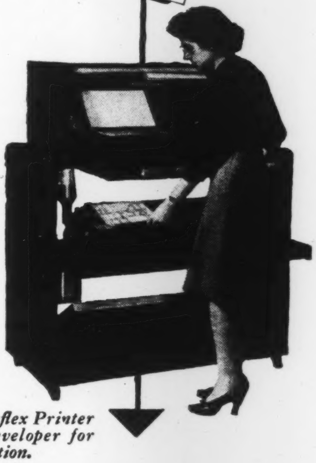
CONCRETE—In a recently developed system, a suitable combination of port-

NO FUMES
NO GADGETS

JUST A FEW *Pleasant* SECONDS TO MAKE BRUNING BLACK AND WHITE PRINTS!

Bruning Model 91 Volumatic Printer-Developer for large volume production.





Bruning Model 2 BW—Copyflex Printer with Model 153M BW Developer for small volume production.

When you choose a process for making direct-line prints, be sure to get one that your operators will *like* to use. The Bruning BW Process keeps operators working at top-notch efficiency. That's because Bruning BW machines have no confusing gadgets to create mistakes and spoil work. And, of course, you need no plumbing connections for Bruning BW equipment—no ducts for dispelling unpleasant fumes. You can put it *anywhere* in the drafting room, engineering department or private office.

AMAZING VERSATILITY! With the Bruning BW process, you can have prints either on cut sheets or roll stock—in amazing variety! For example, Bruning BW Prints can be made with black or colored lines on white backgrounds, or with black or colored lines on green or pink tinted backgrounds. BW Prints also can be made on card-weight or extra thin paper, on cloth or on transparent paper.

PHOTOGRAPHIC PRINTS, TOO! Bruning BW machines may also be used to produce photographic prints—making it possible to duplicate anything drawn, typed, printed or illustrated, as well as to make BW Prints. With the use of Copyflex materials, Bruning machines copy tracings, line drawings, specifications, Van Dyke negatives, blue prints, etc. Original material with copy on both sides can be reproduced from either side or both sides.

GET ALL THE FACTS ABOUT BW. Find out for yourself why so many users prefer to make direct process black line prints the simple, easy and pleasant way with the Bruning BW process. The coupon will bring you full information!

BRUNING

CHARLES BRUNING COMPANY, INC.

Since 1897

NEW YORK • CHICAGO • LOS ANGELES

Atlanta • Boston • Cleveland • Detroit • Houston • Kansas City
Milwaukee • Newark • Pittsburgh • St. Louis • San Francisco • Seattle

CHARLES BRUNING COMPANY, INC.
4714-34 Montrose Avenue
Chicago 41, Illinois

Gentlemen: I want to know more about Bruning BW Prints and equipment. Please send me information.

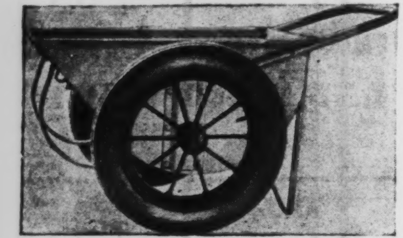
Name..

Company..

Street..

City.......................................*State*....................

land cement concrete and liquid asphalt emulsion of high penetration properties, offered under the trade name of Creteseal, produces better cushioning effect and much greater density in concrete. Benefits are high water repellency, high resistance to brine solutions, improved thermal resistance and reduction of physical discomforts.—*Flash-Stone Co., Inc.,* 3723 *Pulaski Ave., Philadelphia* **40,** *Pa.*



CONCRETE BUGGY—New concrete buggy rocker design makes for easy dumping and eliminates all kickback when it is tipped over. Buggy, with capacity of 6½ cu. ft., is equipped with roller bearings, two- or four-ply pneumatic tires, and 10-spoke steel wheels. Unit is of nesting type with full-welded seams and is equipped with "towing eye."—*Muller Machinery Co., Inc., Metuchen, N. J.*

MEN AND JOBS

A. B. Goodwin, a consulting engineer at San Francisco before joining the United States Geological Survey in Texas in 1929, has been appointed engineer in charge of the Asheville, N. C., office of the survey, succeeding **W. R. Eaton,** who has been transferred to the Louisiana State district office at Baton Rouge to succeed **Edward B. Rice,** who recently was appointed engineer for the North Carolina district office at Raleigh. Eaton has been hydraulic engineer in charge of the Asheville office for the past four years, and formerly served in a similar capacity at Chattanooga, Tenn.

The Asheville office area includes Tennessee river drainage in North Carolina and Georgia and works in cooperation with the Tennessee Valley Authority in stream gauging, flood control, prepares records for flood forecasts, and works with the city of Asheville on water supply. Goodwin is a graduate of Leland Stanford University and since joining the survey has served in Texas, New Mexico, Washington, Oregon and in Washington, D. C. He has been with the Asheville office since January, 1945.

William Echols Ball, assistant county engineer, Jacksonville, Fla., has resigned to accept a commission as major in the regular Army. Mr. Ball has been connected with the county's engineering department for 21 years. He served in the war from November, 1940 to November, 1945.

D. C. Frick, of Columbia, has been appointed construction engineer for the South Carolina State Health Department's newly created hospital division. He will advise communities wishing to build hospitals and health centers and will review plans and specifications to determine compliance with state and federal requirements. He has been with the Health Department since 1942.

Harry Waugh has resigned as road design engineer for the Louisiana Highway Department to enter private industry. Mr. Waugh has been with the department for 18 years. He served as road design engineer since 1940 and

Where else can you get all these features?
WIDE BASE RIMS: First in the field to introduce the wide base rim.
BRAKE: 12¼ x 6 "S" cam brake gives shortest stopping distance ever obtained on 15" tires.
AXLE: 6 x 6 H beam straight through axle, machine straightened, maintaining passenger car wheel alignment.
HEAVY DUTY FRAMES: All welded construction, with one piece main beams extending through the entire frame.
HEAVY DUTY
LA CROSSE
TRAILER CORPORATION
Dealers in all 48 States.
LA CROSSE, WISCONSIN

FAIRBANKS-MORSE POMONA VERTICAL TURBINE PUMPS

WATER-LUBRICATED: OPEN IMPELLERS.

OIL LUBRICATED: CLOSED IMPELLERS.

FAIRBANKS-MORSE
POMONA
SALES
SERVICE

You can take your choice at the "BIG STORE" . . .

The "Big Store" is an American institution, where a man can get a better buy from a broader choice. That's why most buyers go to a Fairbanks-Morse-Pomona dealer for their vertical turbine pumps.

They know that these dealers are not restricted in their recommendations. They know that they'll get impartial help in buying the right pump.

For instance, Fairbanks-Morse offers a choice of oil or water lubrication, open or closed impellers. This is greater surety of getting skilled, unrestricted service in obtaining the pump that is most suited to your particular pumping work.

VISIT YOUR NEAREST FAIRBANKS-MORSE- Pomona dealer: Take advantage of the extra value in trading from the "Big Store in the pump industry"!

FAIRBANKS-MORSE

A name worth remembering

DIESEL LOCOMOTIVES • DIESEL ENGINES • MAGNETOS • GENERATORS • MOTORS • PUMPS • SCALES • STOKERS • RAILROAD MOTOR CARS and STANDPIPES • FARM EQUIPMENT

THIS SHEETING PAID OFF AT 100 TO 1

This is how engineers cut costs and speeded the trenching work on an extensive sewer construction program. They specified ARMCO Steel Sheeting and reused it more than 100 times.

The small displacement area of ARMCO Sheeting makes it easy to drive — easy to pull. Corrugated design assures ample strength yet keeps weight down to facilitate handling and speed installation. In driving, sections butt together or are held securely in place by continuous interlocking joints that assure correct alignment and practical water-tightness.

You'll find other economies in ARMCO Sheeting too. It is low in first cost because you buy only the exact weight you need. And since the sheeting is nestable it requires comparatively little space for shipment and storage.

Write us for prices and detailed information. Armco Drainage & Metal Products, Inc., and Associated Companies, 305 Curtis St., Middletown, O.

ARMCO

ARMCO STEEL SHEETING

earlier was district engineer in Monroe. The bridge and road design sections are to be consolidated under J. B. Carter, who has been bridge design engineer.

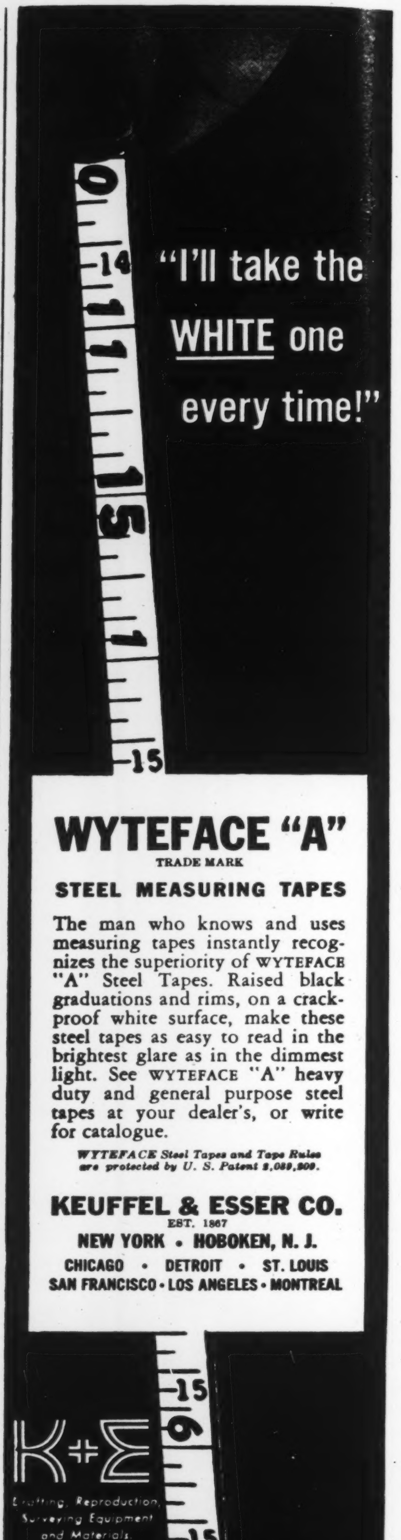
The Pennsylvania Department of Highways has announced the following appointments: **Walter S. Fritz,** of Cherry Ridge Township, Wayne County project engineer in District No. 4, Scranton; **Edwin S. Wallace,** Easton, junior district construction engineer, District No. 6, Ardmore; **Charles H. Reilly,** Altoona, project engineer in District No. 9, Hollidaysburg. **Harvey W. Gehr,** from assistant chief maintenance engineer at Harrisburg to be assistant district engineer at Williamsport. **A. E. Farringer,** from assisting district engineer at Williamsport to be district construction engineer at Williamsport. **J. Earl Buch,** from district construction engineer, assigned to the central office at Harrisburg, to become assistant district engineer at Harrisburg. **Karl F. Chapel,** from assistant district engineer at Harrisburg to be advanced materials engineer at the Harrisburg Testing Laboratory.

James H. Thomas, state highway engineer at Oneonta, N. Y., will become associate civil engineer with the State Highway Department at Binghamton, N. Y. For 20 years, Mr. Thomas has been state highway engineer for Otsego County. He has been with the state Department of Public Works for 33 years.

Guy E. Lerner, of Baltimore, Md., has been named the first field expert of the new Maryland Water Pollution Control Commission. He is one of three chemists who will work for the commission in its effort to make Maryland waters clean.

Pierce B. McIntosh recently announced the opening of an office in North Sacramento, Calif., for civil engineering, specializing in sanitary work. Mr. McIntosh is a graduate of the University of California and was 5 years with the Sacramento District, Corps of Engineers.

Robert Westwick, Santa Barbara County, Calif., road engineer since 1943, has been appointed road commissioner by the county board of supervisors under a new state law calling for appointment of one man to head all road work in a county—planning, construction and accounting. Mr. Westwick has been county road engineer since 1935 except for a 2-year period ending in 1943 in which he was employed by a private contractor in the building of Camp Cooke and Goleta Marine Base.


"I'll take the WHITE one every time!"
K+E
Drafting, Reproduction, Surveying Equipment and Materials. Slide Rules, Measuring Tapes.

WYTEFACE "A"
TRADE MARK
STEEL MEASURING TAPES

The man who knows and uses measuring tapes instantly recognizes the superiority of WYTEFACE "A" Steel Tapes. Raised black graduations and rims, on a crack-proof white surface, make these steel tapes as easy to read in the brightest glare as in the dimmest light. See WYTEFACE "A" heavy duty and general purpose steel tapes at your dealer's, or write for catalogue.

WYTEFACE Steel Tapes and Tape Rules are protected by U. S. Patent 2,089,209.

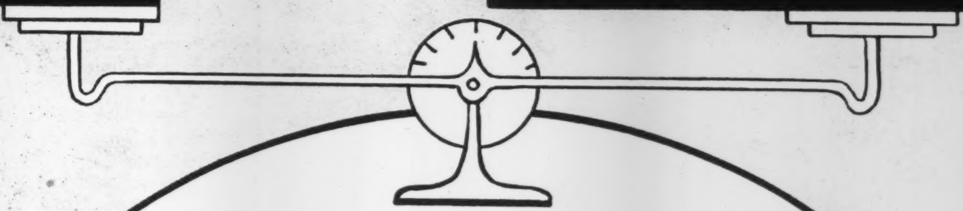
KEUFFEL & ESSER CO.
EST. 1867
NEW YORK • HOBOKEN, N. J.
CHICAGO • DETROIT • ST. LOUIS
SAN FRANCISCO • LOS ANGELES • MONTREAL

COMPARE A *Page Automatic*

ONE CU. YD. CARRYING CAPACITY

WITH YOUR PRESENT DRAGLINE BUCKET

ONE CU. YD. RATED CAPACITY



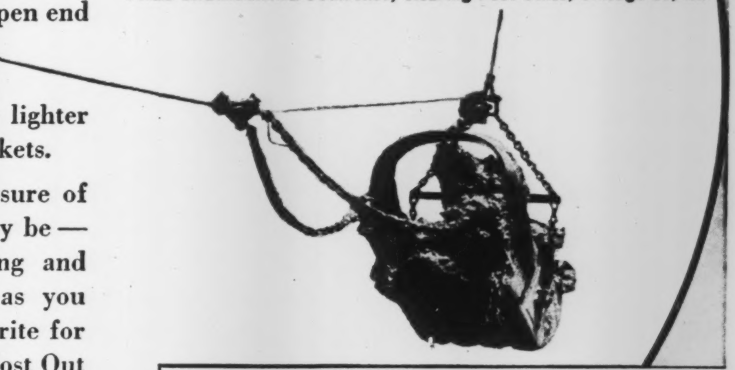
The Page AUTOMATIC has always been built large enough to make the carrying capacity *equal* to the rated capacity size. A one cubic yard Page bucket will load and carry one cubic yard of material—but many buckets rated at 1 yd. cannot do it. A bucket with a struck measure of less than 31.8 cu. ft. cannot possibly average a one cu. yd. payload.

Ordinary buckets do not have sufficient allowance for the curved portions and the open end and, therefore, carry as low as ¾ or ½ as much material as the rated capacity indicates. That's another reason why lighter weights are claimed for ordinary buckets.

We suggest checking the struck measure of your bucket — whatever the size may be — to actually see if you are loading and carrying out as much material as you should be. Ask your dealer or write for new booklet "How to Get the Most Out of a Page AUTOMATIC Dragline Bucket" which includes the listings of minimum struck measurements required in all size buckets for the *true* capacity rating.

No matter if you need a perforated — slat — or regular dragline bucket — get a Page AUTOMATIC— they're the lightest and sturdiest made and are guaranteed to outdig any other dragline bucket at any depth.

PAGE ENGINEERING COMPANY, Clearing Post Office, Chicago 38, Ill.



PAGE *Automatic*

DRAGLINE BUCKETS and WALKING DRAGLINES

PAGE ENGINEERING COMPANY
Clearing Post Office
Chicago 38, Ill.

Please send me a copy of your new 20-page booklet "How to Get the Most Out of a Page AUTOMATIC Dragline Bucket."

Name..

Firm..

Address..

City..Zone..............State..................................

MUELLER SELF-OILING TOP ELIMINATES PERIODIC OILING
MUELLER IMPROVED FIRE HYDRANT
MUELLER SAFETY FLANGE COST OF PARTS LESS THAN $8.00
MUELLER
Means Most!
since 1857

A hydrant in the community is a symbol of protection much in the same way the MUELLER trademark imprinted on that hydrant stands for protected quality. Every item bearing this trademark has been thoroughly engineered from actual field experience, designed for the needs of operating conditions and precision-built to insure superior "on the job" performance. When you specify MUELLER, the product is backed by 90 years experience and a full warranty!

DEPENDABLE SINCE 1857 FULLY WARRANTED OUR 90th YEAR

MUELLER CO.

FACTORY: *Chattanooga, Tenn.* MAIN OFFICE AND FACTORY: *Decatur, Ill.*
OTHER FACTORIES: *Los Angeles, Cal.* • • • • *Sarnia, Ont. Canada*

Elections and Activities

Capt. M. Y. Neely, New York, director of the Civil Engineering Corps Reserve, Third Naval District spoke recently at a meeting of the chapter at Hartford, Conn. Captain Neely outlined the position of the Civil Engineering Corps as a reserve component in the Naval Reserve program. An organization meeting is scheduled for September 9 in that section to which all former Civil Engineering Corps officers and Seabees construction battalion enlisted men are invited. A roster of officers and men in the construction battalions is incomplete and all former members who are interested should notify Irving W. Rutherford, 182 High St., Hartford, or Anthony Pasquariello, Box 108, Torrington.

John W. Hager has been elected president of the Engineers Club of Birmingham, Ala. Joe R. Hill elected vice-president; C. P. Shook, Jr., secretary-treasurer; Mrs. Lucile M. Cunniff, executive secretary.

A meeting of the Western Canada Reclamation Association recently heard Agriculture Minister Gardiner's estimate that four proposed water conservation projects for Western Canada would cost $100,000,000 and take at least 12 years to build. The projects are the St. Mary's Dam and Bow River and Red Deer projects, all in Alberta, and the South Saskatchewan River project in Saskatchewan. Work is under way on St. Mary's Dam.

The Greensboro, N. C., Engineers Club has just been organized with Carroll L. Mann, Jr., of Mann and McLawhorn, engineers and architects, elected president. Other officers are: J. Dan McConnell, vice-president; and S. M. Sprowl, Jr., secretary and treasurer.

Eugene C. Skinner has been elected president of the Charleston, S. C. Contractors Association. Other officers are Ralph B. Simmons, vice-president and Thomas A. Hayden, secretary. The new president succeeds E. Gaillard Dotterer.

At a recent meeting of the District of Columbia Society of Professional Engineers, Herbert Manuccia, a consulting engineer, was elected president for his second term. Other officers are: C. Warren Bogan, consulting engineer, first vice-president; Melville L. Brown, president of Melville L. Brown Asso-

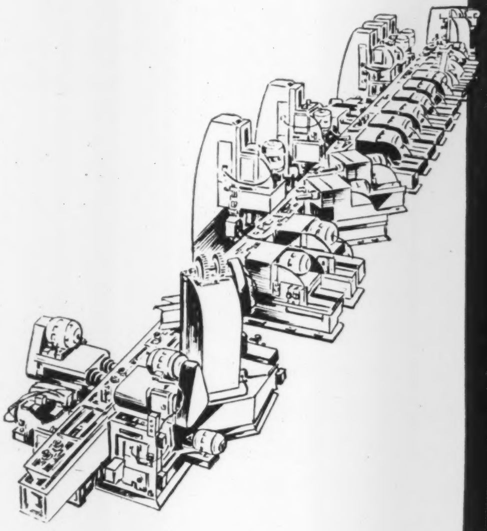
In More Than 30 Booths at the MACHINE TOOL SHOW...

1947 MACHINE TOOL SHOW
CHICAGO SEPT 17-26

YOU WILL SEE THE

Many Applications

OF VICKERS HYDRAULIC CONTROLS



Machine Tool Builders use Vickers Hydraulic Equipment to meet the ever increasing demand for Higher Production Rates, Reduced Parts Costs and Improved Product Quality

Vickers Hydraulic Controls have played a significant part in the development of many modern machine tools because they provide the designer with opportunities for improvement not available by other methods. From simple machine tools to completely automatic processing machines, Vickers Hydraulic Equipment makes good machines even better.

You can see the many advantages which Vickers Hydraulic Controls have contributed to modern machine tools in more than 30 booths at the Machine Tool Show—booths of machine tool builders who are displaying Vickers Hydraulic equipped machines of many types. It will be very much worth your while to inspect these machines.

To make it easy for you to find these exhibits, we have prepared a booklet illustrating the machines, listing the names of the manufacturers and showing their booth locations. Stop at Vickers Booth No. 228 for your copy.

BOOTH 228

Here you will see the latest developments in Vickers Hydraulic Controls. Vickers Application Engineers will be glad to discuss your individual problems.

VICKERS Incorporated
DIVISION OF THE SPERRY CORPORATION
1496 OAKMAN BLVD. • DETROIT 32, MICHIGAN

Vickers Engineering Offices: ATLANTA • CHICAGO • CINCINNATI • CLEVELAND DETROIT • LOS ANGELES • MIAMI • NEWARK • PHILADELPHIA • ROCKFORD ROCHESTER • SEATTLE • ST. LOUIS • TULSA • WASHINGTON • WORCESTER

3241

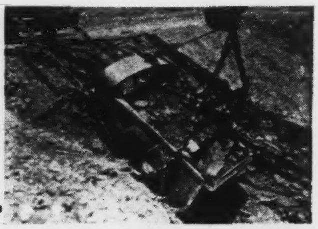
ENGINEERS AND BUILDERS OF OIL HYDRAULIC EQUIPMENT SINCE 1921

"Red Arch" Features

Add up to EXTRA OUTPUT

Digging is Fast and Easy

with a Red Arch bucket because the teeth and sharp cutting edge are set at just the right angle . . . and the high arch permits heaping loads to flow easily into the bucket.

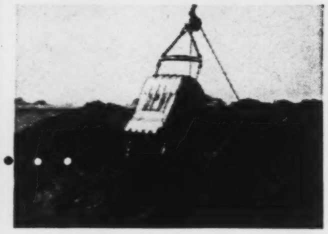


Carrying is Smooth,

thanks to careful design and perfect balance. Even with a heaped load and fast swing there's but little spillage with a Red Arch bucket.

Dumping is Quick and Clean

because the high arch lets the load pass freely, while the rounded lines and smooth inside of the Red Arch eliminate jamming of dirt in corners.



. . . All add up to . . . EXTRA OUTPUT

Let Red Arch buckets add up extra output for you. Write for full information on the three types for light, medium and heavy digging . . . in sizes from ⅜ yard up.

6R46

BUCYRUS•ERIE SOUTH MILWAUKEE WISCONSIN

MacArthur

37 YEARS INSTALLING PILES
OF EVERY TYPE
CAST-IN-PLACE STEEL
CONCRETE SECTIONAL PIPE
COMPOSITE TIMBER
SOIL AND ROCK BORINGS

MacARTHUR CONCRETE PILE CORPORATION
18 EAST 48th STREET. NEW YORK 17, N. Y.
BOSTON • CINCINNATI • NEW ORLEANS

ciates, Inc., engineers, second vice-president; Charles H. Jennings, hydraulic engineer with the Rural Electrification Administration, secretary-treasurer; and Edwin M. Woods, engineer, director of the society. Mr. Manuccia was also named national director of the National Society of Professional Engineers, and Frederick W. L. Hill, aerial lines engineer with the Potomac Electric Power Co., alternate national director.

Jeffrey H. Collins, Sr. has been elected president of the New Orleans Chapter of the American Public Works Association. Other new officers are Thomas B. Becnel, vice-president, and Brooke H. Duncan, Sr., secretary-treasurer. The new administration has announced an active 1947-48 program of local monthly meetings and participation in national activities.

William James, Sharon, Pa., plumbing inspector, has been elected president of the recently formed Western Pennsylvania chapter of American Society of Sanitary Engineers. The group includes all of western Pennsylvania from Johnstown to Erie.

John H. Morrison, consulting engineer, Helena, has been elected chairman of the newly-appointed Montana State Board of Registration for Civil Engineers and Land Surveyors. Organization of the board was authorized by the recent session of the state legislature, Montana becoming the last state to adopt civil engineer registration.

Elected vice-chairman of the group was Richard Hale, Missoula county surveyor and consulting engineer, Missoula, and secretary, Dr. Eldon R. Dodge, head of the civil engineering department of Montana State College, Bozeman. Other board members are A. E. Adami, dean of the University of Montana School of Mines, Butte, and S. D. Waldorf, Gallantin county surveyor, Bozeman.

Although by-laws have not yet been set up, the board is receiving applications for registration. From 110 to 175 engineers are expected to be blanketed into registration by a standard "grandfather" clause between now and Jan. 1, 1948. After that date applicants must pass a prescribed examination.

To maintain the established standard of living in this country, an obligation rests on labor to increase production, asserted delegates to a meeting of western chapters of the Associated General Contractors held in Portland, Ore., recently.

William E. Hague, manager of the Central California chapter, told the

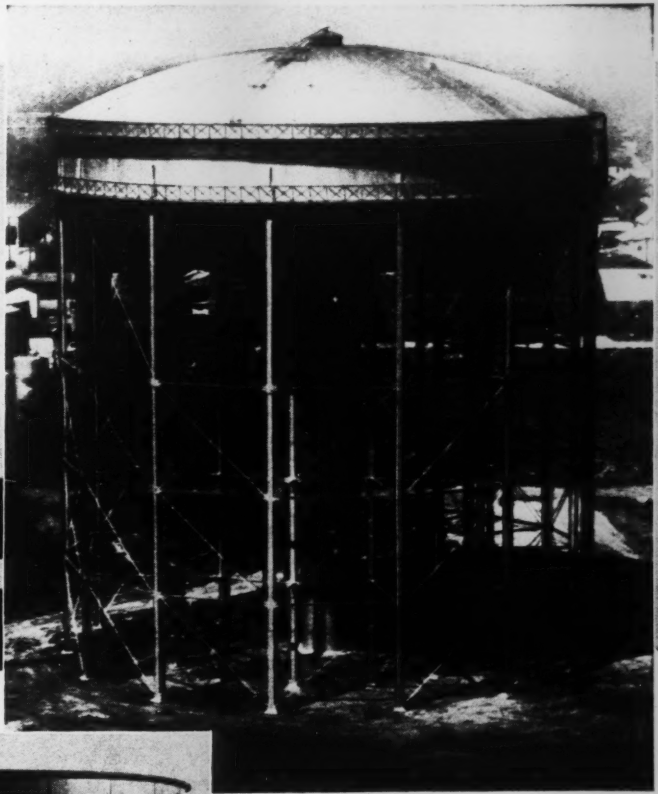
Long-Term Assets to the Modern Waterworks System . . . . .

for EFFICIENT SERVICE · LOWER MAINTENANCE · GREATER DURABILITY

Pittsburgh ·Des Moines

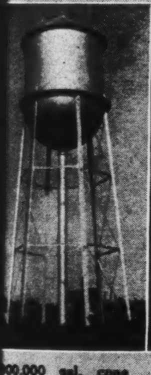
ELEVATED STEEL TANKS

and STEEL RESERVOIRS



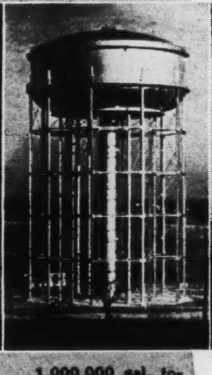
1,500,000 gal. toroidal bottom tank; structural tower. Diameter 103'4", head range 25'; height to bottom 85'. Fort Dodge, Iowa.

Two 3,000,000 gal. steel reservoirs, diameter 144', height 25'. Berryville, Va.

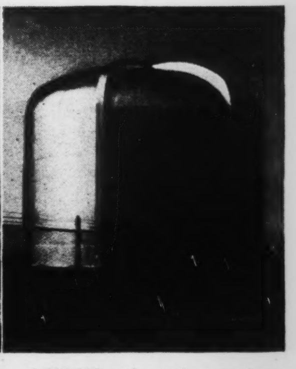


00,000 gal. cone oof, hemispherical ottom tank, 118' to op. Stillwater, Okla.

500,000 gal. double ellipsoidal tank, on 100' tower. Mission, Texas.



1,000,000 gal. toroidal bottom tank; diameter 76'9", height 127', head range 30'. Keokuk, Iowa.



2,200,000 gal. steel reservoir; ellipsoidal roof; ornamental pilasters. Diameter 80', height 51'. Midland, Tex.

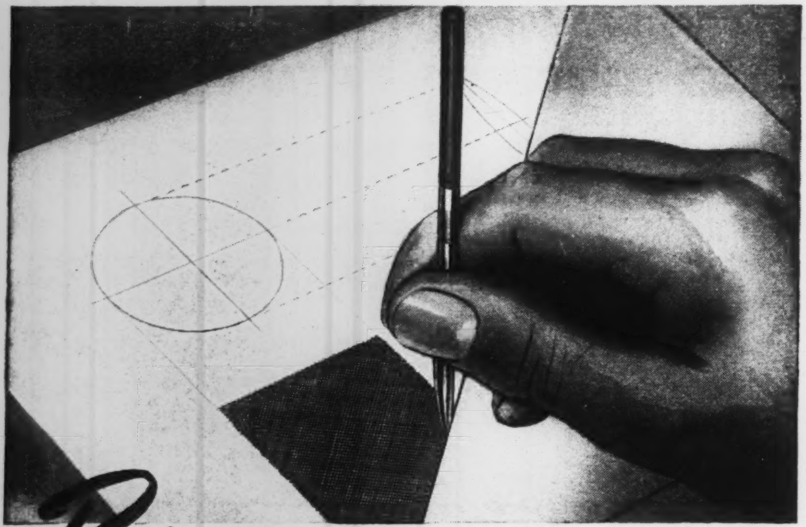
The choice of elevated steel tank or steel reservoir depends largely upon local land elevations. The choice of PITTSBURGH-DES MOINES as designers, fabricators and erectors of your required units is equally logical: you benefit by a half-century of experience in this type of construction, and a guarantee of complete satisfaction with each installation. *May we consult on your water storage needs?*

A NEW
PITTSBURGH
· DES MOINES
STEEL FABRICATING PLANT
at SANTA CLARA,
CALIFORNIA

NOW SERVING
THE FAR WESTERN
STATES

PITTSBURGH · DES MOINES STEEL CO.

PITTSBURGH, PA., 3414 NEVILLE ISLAND · DES MOINES, IOWA, 915 TUTTLE STREET
SANTA CLARA, CAL., 621 ALVISO ROAD
NEW YORK, ROOM 916, 270 BROADWAY · CHICAGO, 1218 FIRST NATIONAL BANK BUILDING
DALLAS, 1219 PRAETORIAN BUILDING · SEATTLE, 522 FIRST AVENUE, SOUTH



Prints . . . AS CLEAN AND SHARP AS YOU CAN DRAW

Special mechanical processing gives Arkwright Tracing Cloths a translucence that produces perfect reproductions. That's why there are no distortions or "ghosts", caused by pinholes, specks or thin spots . . . simply clean, sharp lines.

Arkwright has been preferred for over 25 years, because of its unique ability to produce prints just as crisp and precise as it is possible to draw . . . and do this months and even years after tracings have left the board. Arkwright literally "builds" permanent transparency into every sheet by a special mechanical process. Arkwright tracings reproduce as if nothing but the lines were going through the printer.

And this cloth never becomes brittle with age. It can take erasure after erasure without wearing through.

Check these things yourself at our expense. Send for free working samples. Test them thoroughly . . . you'll soon see what we mean when we say "lines as clear as if suspended in air". Arkwright Finishing Co., Providence, R. I.

★

Sold by leading drawing material dealers everywhere

★

Arkwright
PENCIL CLOTH WHITE
Arkwright
TRACING CLOTH
Matsurf
PENCIL TRACING CLOTH

Arkwright
TRACING CLOTHS
AMERICA'S STANDARD FOR OVER 25 YEARS

group he foresaw no drop in construction costs in the near future. He recommended that local chapters inform the public that present costs are here to stay for an extended period. He commented that although the price level might drop 5 to 10 percent as a result of an increased supply of materials, but would not fall to "any material extent." Contractors attending the meeting concurred with Mr. Hague's view of the cost picture.

In discussing the Taft-Hartley law, delegates maintained that the law was democratic in adjusting the rights of employees and in offering protection for continued bargaining rights with equal distribution of power. The bill seems likely to "revolutionize" labor relations in the construction industry, those attending the meeting felt, but whether it will really help the contractors depends on the character of court decisions rendered.

A permanent committee was appointed to contact national awarding agencies and make an effort to coordinate the millions of dollars of federal appropriations so that a more uniform overall construction program might result.

W. H. H. Putnam, assistant manager, Birmingham Waterworks Co., has been elected president of the Alabama Water and Sewage Works Association, succeeding W. W. Pointer, superintendent of water, lights and sewage, Troy, Ala. Other officers are: Tom Collins, Ozark waterworks manager, vice-president; Alex O. Taylor, director of engineering Alabama Extension Service, secretary; Gilbert H. Dunstan, associate professor of sanitary engineering, University of Alabama, re-elected treasurer; Charles White, State Board of Heath engineer, editor.

Officers of the California Section, American Water Works Association, are as follows: Chairman, H. Arthur Price, Los Angeles; vice-chairman, L. W. Grayson, Riverside; secretary, H. C. Medbery, San Francisco; and national director, Carl Hoskinson, Sacramento.

The organization of a Kansas City, Kan., chapter of the Kansas Engineering society is under way. Invitations have been issued to engineers practicing in the various divisions of their profession in the area, J. O. Armstrong, city engineer, said. In addition to providing members information on the latest developments the chapter will provide an advisory committee to consult with government officials on engineering details of community or city projects.

For the Northern section of the Sew-

For that HEAVY DUTY Job

The Durability of "HERCULES" (Red-Strand) Wire Rope is a big factor in speeding up production, and—consequently—reduces operating costs.

Here is a Wire Rope that provides the Strength, Toughness, Adaptability and Endurance that "Heavy Duty" jobs call for. Its outstanding performance through the years has placed it high on the list of approved equipment in *all* industrial fields.

Made in Round Strand and Flattened Strand Constructions—Preformed and Non-Preformed—there's a type exactly fitted to meet *your* particular requirements.

Your inquiries are invited!

"HERCULES"

REG. U.S. PAT. OFF.

RED-STRAND

WIRE ROPE

MADE ONLY BY

A. LESCHEN & SONS ROPE CO.

ESTABLISHED 1857

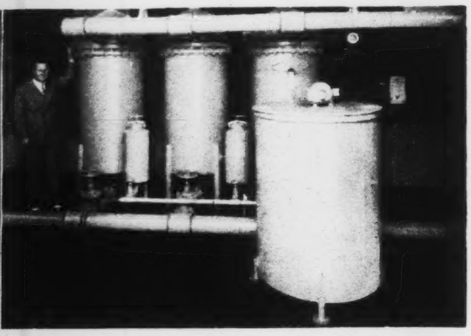
5909 KENNERLY AVENUE • ST. LOUIS 12, MISSOURI

NEW YORK • CHICAGO • DENVER • SAN FRANCISCO • PORTLAND • SEATTLE

HERE'S TO Clear WATER!

%Proportioneers% war-born Diatomaceous Earth Filter, now enlarged and perfected as the Pur-O-Cel Filter, marks a great advance in efficiency and compactness over the conventional Pressure Type sand filter. Small water treatment plants, swim pools and process industries can today have clear, brilliant water, completely free of turbidity. High filtration rates are safe and operation is simple . . . filtering becomes a purely mechanical operation, not a chemical process.

The **PUR-O-CEL** is a pressure type filter using thin mats of interlaced particles of diatomaceous earth instead of a sand bed. The filter is first pre-coated with diatomaceous earth and then is fed a body coat which keeps the filter porous and permits high filtration rates over long periods. Simple backwashing, without disassembling, quickly restores Pur-O-Cel to its original efficiency.



Bring your water clarification process up to date with this new method of filtering.
Write for Bulletin 1550.

% PROPORTIONEERS, INC. %
92 CODDING STREET, PROVIDENCE 1, R. I.

BREAK CONCRETE AND TAMP BACK FILL
THE
LOW COST WAY!
REPAVE IMMEDIATELY

Junior Model T

LOWER YOUR TRENCH WORK COSTS MANY TIMES BY USING RAPID PAVEMENT BREAKER MACHINES.

Write for details, information on other models and prices.

R. P. B. CORPORATION
1517 Santa Fe Avenue
Los Angeles, 21, Calif.

age Treatment Plant Operators of Illinois the following officers have been elected: chairman, Clarence Hill, superintendent of sewage treatment, Dixon; vice-chairman, Howard H. Hahn, operator, Dixon State Hospital sewage treatment works, Dixon; secretary, Mil Prentice, operator, sewage treatment works, Rochelle.

The following officers have been elected for the Northwest Section of the Water Plant Operators of Illinois: Chairman, J. C. Moonau, manager, Northern Illinois Water Service Co., Sterling; secretary, H. S. Merz, superintendent of water, Rockford.

The Central Section of the Sewage Plant Operators of Illinois has elected the following officers: Chairman, Walter Kunsch, engineer-manager, Urbana-Champaign Sanitary District; vice-chairman, L. J. Arthur, superintendent, sewage treatment works, Lincoln; secretary, Warran Jenkins, operator, Illinois Masonic Home, Sullivan.

New officers installed by the California Sewage Works Association at a luncheon held during the recent convention of the Federation of Sewage Works Associations in San Francisco are as follows: President, Harold L. May, Palo Alto; first vice-president, R. L. Derby, Los Angeles; second vice-president, R. R. Ribal, Oakland; secretary-treasurer, L. H. Cook, Menlo Park; and new member of the board of directors, H. B. Foster, Jr., Berkeley. The 1948 meeting of the California group will be held in San Diego.

The Minnesota Good Roads Association has voted to assist the Minnesota State Automobile Association in its law suit to test the validity of the 1947 legislative act providing for transfer of $214,330.46 from the trunk highway fund to the general revenue fund for the cost of collecting gasoline taxes. It was agreed to request Governor Luther Youngdahl to name a citizens' committee to assist the interim committee in its investigation and recommendations on highway needs.

E. K. Van Winkle has been elected president of the Georgia Chapter, Associated General Contractors of America. Other officers are Ira H. Hardin, first vice-president; Merrill W. Newbanks, second vice-president; J. J. Black, secretary; A. J. Collins, treasurer. Directors are Otis A. Barge, E. M. Beckham, R. A. Bowen, P. D. Christian, W. E. Fennell, Carroll Griffin, Jiroud Jones, Farquhar McRae, H. E. Peel, E. A. Pound, W. F. Scott and J. P. Wey.

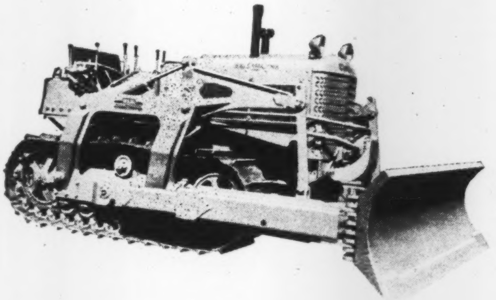
Uncover larger
earthmoving
Profits

. . . roll back the dirt quickly with Heil Hydraulic Bulldozers

The dirt really rolls back when you use a Heil Hydraulic Bulldozer. Yardages are bigger — costs lower. The secret of this unequalled rolling action lies in the design of the Heil Bulldozer blade. The scientific contour of this blade, developed after many years of earthmoving experience, provides a cleaner cutting action and a bigger load-carrying capacity without increasing size or weight. The cutting edges, made of special wear-resistant steel, are reversible. The additional life gained is just another of many Heil cost-cutting features. Here are a few more that save you time and money on any job:

The easy-handling, trouble-free Heil hydraulic unit provides quick finger-tip control. The positive action enables the operator to place the blade exactly where he wants it — he can dig faster and move more dirt. The all-welded, box-section construction, the sturdy connections, and the proper distribution of loads and stresses keep your tractors on the job longer — making bigger profits for you. Install a Heil Hydraulic Bulldozer on your Oliver-Cletrac as soon as possible. It's an easy, quick mounting job. See your Oliver-Cletrac distributor.

R-92



Heil Trailbuilder blades have the same scientific contour as Heil bulldozers. One man can change the blade angle in less than 5 minutes. The end tilt adjustment also can be made quickly and easily — there are no bolts, nuts, or wedges to handle.

THE HEIL CO.

GENERAL OFFICES • MILWAUKEE 1, WISCONSIN

4 CYCLE
BRIGGS & STRATTON
GASOLINE ENGINES
Your assurance of all that is best in gasoline engine performance
AIR-COOLED POWER
Preferred Power
FOR INDUSTRIAL CONSTRUCTION RAILROAD AND FARM EQUIPMENT

The 27-year record of *proved performance* by more than 3 million Briggs & Stratton engines is conclusive proof of the value of long experience. Today's Briggs & Stratton 4-cycle air-cooled engines assure all that is best in dependable, trouble-free operation — because *more experience is built into them* than any other air-cooled gasoline engines.

BRIGGS & STRATTON CORP., MILWAUKEE 1, WIS., U. S. A.

Manufacturers' Activities

Rudolph Furrer, for ten years vice-president in charge of engineering for the A. O. Smith Corp., Milwaukee, Wis., has resigned to accept a position as vice president in charge of research and engineering with the American Car & Foundry Co., New York.

T. **Clayton Cheney**, manager of sales promotion and advertising for Milcor Steel Co., Milwaukee, Wis., an Inland Steel Co. subsidiary, has been given the additional appointment of advertising manager of the Inland Steel Container Corp.

H. E. **Swanson**, engineer with Unit Crane & Shovel Corp., Milwaukee, Wis., since 1939, has been promoted to consulting engineer with the firm, and E. F. Reuter has been named chief engineer.

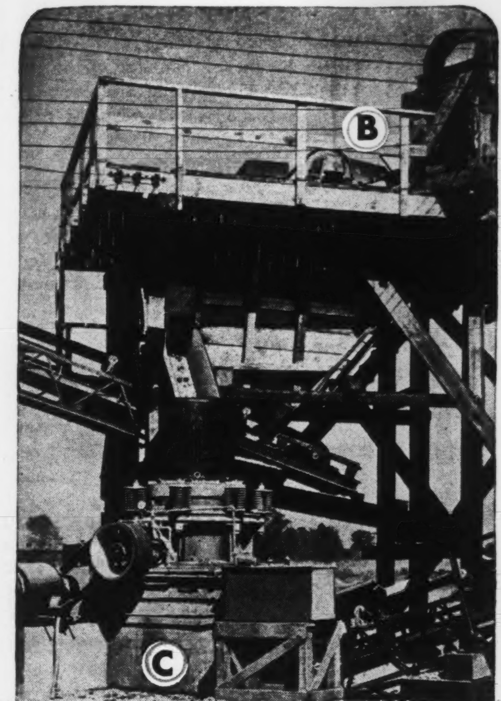
Lone Star Cement Corp, New York, N.Y., announces the election of Thorkild Avnsoe as executive vice president and J. H. Leikhim as vice president and treasurer succeeding A. V. Lemasters, retired. The following appointments have also been made: Claiborne C. Van Zandt, chief engineer; I. C. Brotzman, domestic operations manager; N. M. DeBrun, foreign operations manager; Fred C. Schieber, general superintendent, eastern division.

Claude E. **Harper** has been appointed assistant general manager of Standard Gypsum Co. of Calif., heading production operations at the company's newly opened Long Beach, Calif., gypsum lath and board plant. Gil F. Richards has been named sales manager.

H. J. **Philip** has been appointed assistant general manager of Eastern Steel Products, Limited, Toronto, and its subsidiaries, the A. B. Ormsby Company, Limited, and W. D. Beath & Son, Limited.

Steady growth of industry in the San Joaquin Valley area of California has led to the opening of a new branch office of the **Minneapolis-Honeywell Regulator** Co. to service the territory, located temporarily at 1357 N. Street, Fresno. Clyde N. Bradley has been appointed district representative.

Hugh J. **Fraser**, vice president of The International Nickel Company, Inc., has been placed in general charge of all plant operations of the company

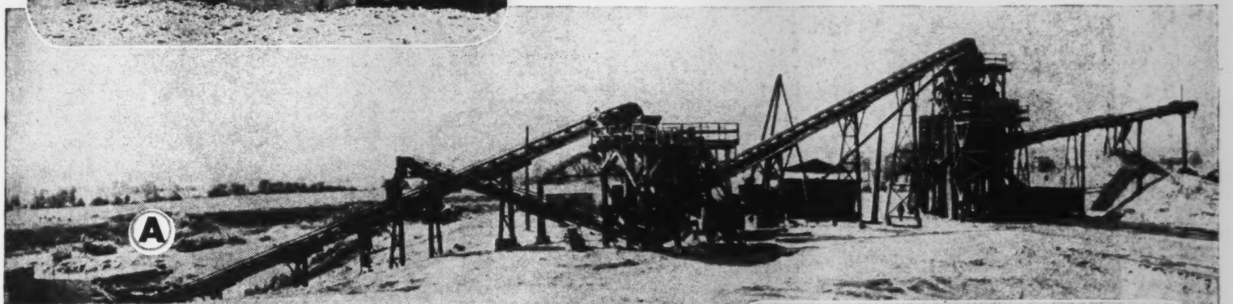


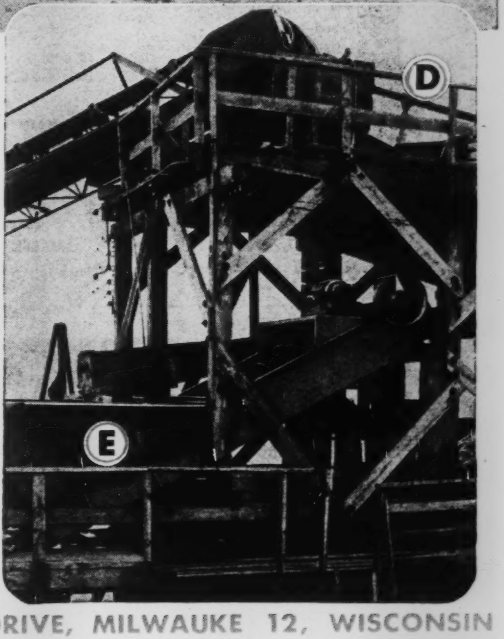
TELSMITH
designed and equipped

The Waupaca Sand & Gravel Co. plant at Custer, Wis., will handle about 175 tons per hour—producing concrete aggregate, 1½″ to ¾″; ¾″ to ⅜″; pea gravel and concrete sand. It is owned and operated by F. F. Mengel Co., Wisconsin Rapids, Wis.

TELSMITH EQUIPMENT INCLUDES:

• (A) 30″ x 5′-6″ Special Plate Feeder • (B) 5′ x 12′ Single Deck Pulsator Scalper • (C) 28″ Intercone Crusher • (D) 4′ x 12′ Triple Deck Pulsator • (E) 20″ x 15′ Twin Screw Sand Classifier • 24″ x 203′, 18″ x 60′ and 24″ x 111′ Belt Conveyors • Twelve Bin Gates





READ WHAT MR. F. F. MENGEL OWNER AND OPERATOR SAYS ABOUT TELSMITH COMPLETE PLANT SERVICE

"We wish to express our satisfaction with the gravel washing and screening plant you sold us. Each separate unit does exactly the work it was purchased for, with ample capacity and quiet running which makes for long life. Thank Elmer Kraig for the very fine drawings he made. We built each unit separate and when we set the conveyors and machines they were just where they should be with no changes necessary."

Telsmith's 40 years of engineering *know-how* is at your disposal. *Consultation without obligation.* Send for Equipment Guide G-2.

G-14

SMITH ENGINEERING WORKS, 500 E. CAPITOL DRIVE, MILWAUKE 12, WISCONSIN

Cable Address: Sengworks, Milwaukee

**51 East 42nd St.
New York 17, N.Y.**

**211 W. Wacker Drive
Chicago 6, Ill.**

**713 Commercial Trust Bldg.
Philadelphia 2, Pa.**

**247 Third Street
Cambridge 42, Mass.**

**Boehck Eqpt. Co.
Milwaukee 3, Wis.**

**Mines Eng. & Eqpt. Co.
San Francisco 4, Calif.**

Clyde Equipment Co., Portland 9, Ore., & Seattle 4, Wash. • Brandeis Machinery & Supply Co., Louisville 8, Ky. • Southern Eqpt. & Tractor Co., Monroe, La. • Rish Equipment Co., Charleston 22, & Clarksburg, W. Va.—Roanoke 7, & Richmond 10, Va. • Wilson-Weesner-Wilkinson Co., Knoxville 8, & Nashville 6, Tenn.

CLEAR LIQUID PUMPS
IN WIDE RANGES OF CAPACITY AND HEAD
Double Suction, Single and Two Stage Centrifugal Axial and Mixed Flow, Deep Well Turbine

DOUBLE SUCTION
For a wide range of applications in general water supply and clear liquid transfer. Split case, ball bearing design. Enclosed type, bronze impeller with all water passages hand finished and exterior surfaces machined. Capacities from 50 to 7000 GPM. Heads from 25 to 250 feet. *Send for Bulletin No. 248.*

TWO STAGE CENTRIFUGAL
For water and clear liquid booster service. Split case, ball bearing design. Passage from first to second stage entirely within casing, reducing friction losses to minimum. Back-to-back, single suction, bronze, enclosed impellers. Capacities from 50 to 1500 GPM. Heads from 50 to 450 feet. *Bulletin No. 246.*

SINGLE STAGE CENTRIFUGAL
A general all-purpose transfer pump for lower heads in capacities from 50 to 550 GPM. Enclosed impeller, ball bearing design with renewable cover packing box and (optional) wearing rings. For liquids other than water, interchangeable contact parts of special alloys can be furnished. *Bulletin No. 251.*

AXIAL FLOW
A large volume, low lift, submerged pump producing from 500 to 10,000 GPM at heads from 5 to 25 feet. Dilution of lubricant, and corrosion or abrasion of bearing surfaces by seepage of pumped liquid into lower bearing is prevented by an exclusive (patented) vacuum arrangement in the propeller that relieves high pressure on the grease seal. Designed for drainage, irrigation, primary municipal pumping, and dewatering. *Write for details.*

ENGINEERING SERVICE—Our engineering staff is well qualified to cooperate with consulting and operating engineers in the selection of pumping equipment to meet individual needs.

AMERICAN WELL WORKS
IN OUR 78TH YEAR
136 North Broadway
AURORA, ILLINOIS
AMERICAN
Pumping, Sewage Treatment, and Water Purification Equipment
RESEARCH • ENGINEERING • MANUFACTURING
Offices: Chicago • New York • Cleveland • Cincinnati • Kansas City • Sales Representatives throughout the World

McKiernan-Terry
PILE HAMMERS and EXTRACTORS
Now made in sizes of complete, standardized line of ten double-acting hammers, five single-acting hammers and two double-acting extractors. Write us for free descriptive Bulletins 55 and 57.
MK-237
McKIERNAN-TERRY CORPORATION MANUFACTURING ENGINEERS
13 PARK ROW, NEW YORK 7, N. Y.

in the United States. John A. Marsh, assistant general manager of the Huntington W.Va. works, has been appointed Mr. Fraser's assistant, with the title of assistant to the vice president.

A new sales office has recently been established by THE OKONITE CO., manufacturers of electrical wires, cables and splicing tapes, at 516 Building Industries Bldg., 626 Broadway, Cincinnati 2. It is in charge of S. W. Pollock.

Establishment of a sales office for the state of Texas, with Harvey M. Harker as general branch manager, was announced by the MONSANTO CHEMICAL CO. Headquarters of the new office, which will handle the company's products other than phosphates and plastics, will be in Houston.

GEORGE J. STANLEY, director, vice president and general sales manager for Aluminum Company of America, has retired as vice president and general sales manager. He will continue as a director of the company. Ralph V. Davies, Robert B. McKee, and Donovan Wilmot, assistant general sales managers for Alcoa, have been promoted to vice presidents of the company. Mr. Davies will also become general sales manager succeeding Mr. Stanley.

H. K. PORTER CO. announced the promotion of Harold A. Hintz to Pacific Coast sales manager. He will direct the activities of all Porter sales offices on the Pacific Coast and will maintain headquarters in the Petroleum Building, Los Angeles. J. F. Morley, has become district sales engineer, 681 Market St., San Francisco 5, Calif.

THE SAWHILL MANUFACTURING CO. has recently completed a plant expansion program at Sharon, Pa. Sawhill specializes in the production of prefabricated pipe.

DEARBORN MOTORS which is marketing nationally the Ford tractor and Dearborn farm equipment line plans to spend approximately $2 million during the next twelve months on advertising, sales promotion, merchandising, and sales training programs. Complete advertising and sales promotion plans will be announced at distributor-dealer meetings in 33 key cities.

H. D. WORTHINGTON has been appointed supervisor, construction material sales, Chicago district, American Steel & Wire Co., the U. S. Steel subsidiary announced.

The following changes in sales personnel of BETHLEHEM STEEL CO. have been made: J. M. Ellis, appointed as-

■ Collector ditch and relief wells, Sardis Dam, Vicksburg Engineer District, Vicksburg, Miss. Lehigh Sulphate-Resisting Cement was used in the concrete. *General Contractor:* Anderson Bros., Houston, Texas; *Sub-Contractor:* Shanahan Construction Co., St. Louis, Mo.

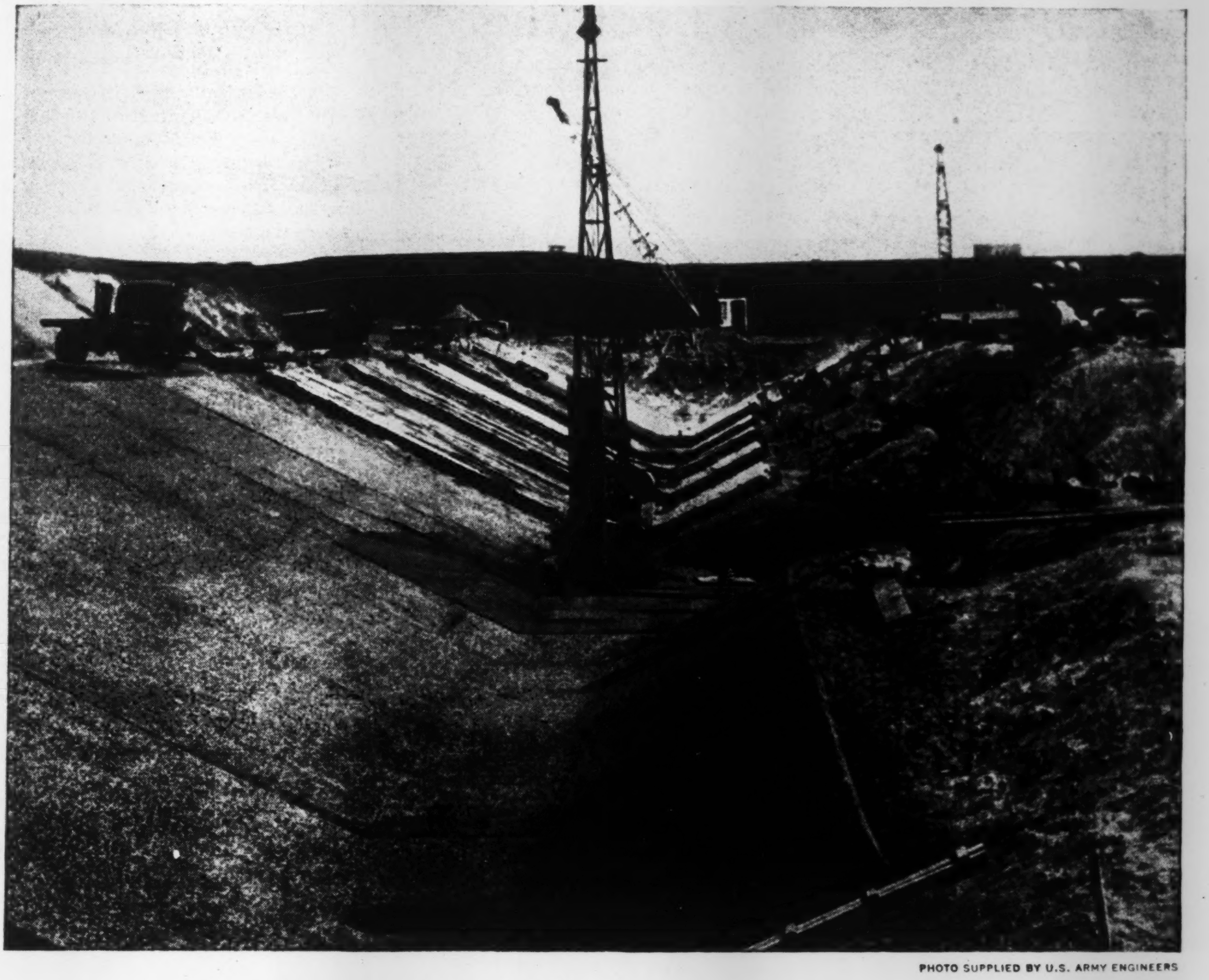


PHOTO SUPPLIED BY U.S. ARMY ENGINEERS

The contractor asked a $64 question ...... Lehigh had the right answer

■ The U. S. Army Engineers specified Sulphate-Resisting Cement for the concrete drainage system on the Sardis Dam project, Sardis, Miss.

So rarely is this type of cement used that most contractors never encounter this specification. Yet when the Shanahan Construction Company needed a source of supply, Lehigh had the cement to meet the requirements.

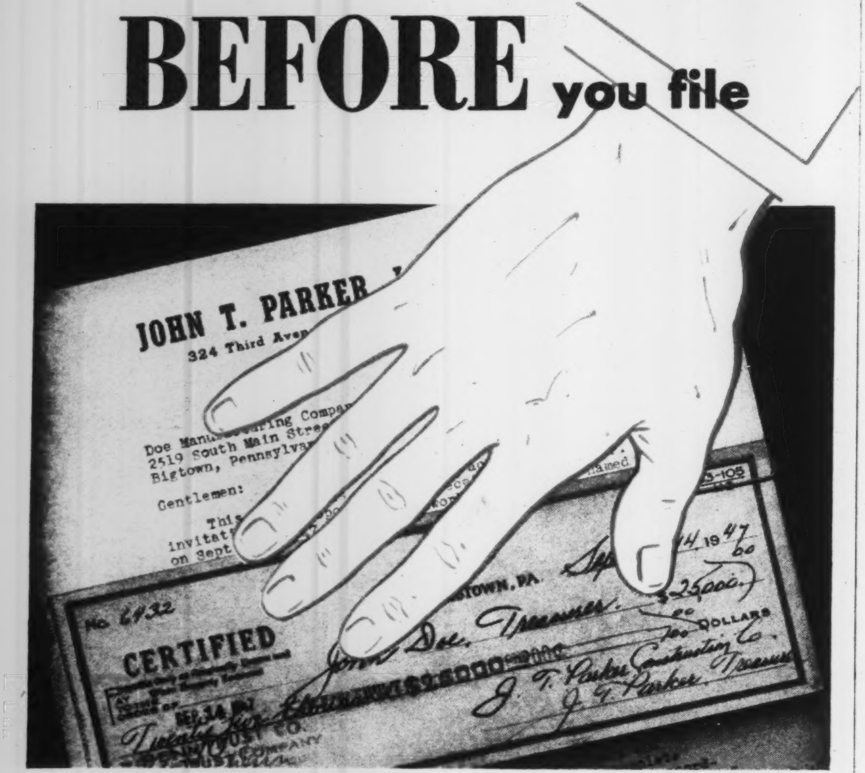
That's the kind of service engineers and contractors have come to expect from Lehigh over the last 50 years.

Lehigh
CEMENTS

LEHIGH PORTLAND CEMENT COMPANY
ALLENTOWN, PA. • CHICAGO, ILL. • SPOKANE, WASH.

LET THE LEHIGH SERVICE DEPARTMENT WORK WITH YOU ON YOUR SPECIFIC PROBLEMS

BEFORE you file



that Certified Check . . .

Check With Your Surety

When a performance bond is to be required, be sure to discuss the job with your surety before filing your certified check. By arranging for their bonding requirements in advance, wise contractors save time and trouble.

Establish your credit now with Ætna . . . a surety thoroughly acceptable on public or private jobs in any part of the country. Trained and experienced Ætna representatives are available to serve you wherever you may be. Why not talk it over with the Ætna man in your community today?

ÆTNA

Agents from Coast to Coast

ÆTNA CASUALTY AND SURETY COMPANY
Affiliated with Ætna Life Insurance Company
Automobile Insurance Company Standard Fire Insurance Company
HARTFORD 15, CONNECTICUT

sistant to vice-president; K. L. Griffith, general manager of sales; D. C. Roscoe, assistant general manager of sales; A. T. Hunt, manager of sales, sheets and strip; M. C. Schrader, assistant to the vice-president.

Oliver F. Gang was elected president, director, and general manager of the Ludlow Valve Manufacturing Co., Inc., succeeding Alfred W. Thompson, who becomes chairman of the executive committee and continues as treasurer of the company.

The Cummins Engine Co., Inc., Columbus, Ind. announces the following action by the Board of Directors. R. E. Huthsteiner, vice-president and general manager, was elected a director; Edwin G. Crouch was elected secretary; Waldo M. Harrison was elected treasurer and will continue as controller. The resignation of H. L. Knudsen as vice-president of engineering was accepted with regret.

Col. A. E. (Cappy) Higgins has been named vice president of the Rockwell International Corp., New York City, it was announced by the Rockwell Manufacturing Co., Pittsburgh, the parent concern.

Announcement of the opening of new sales and executive offices at 1106 West 35th St., Chicago, Ill. was recently made by the C. R. Jahn Co., manufacturers of heavy-duty, low-bed trailers. Factory and accounting offices will remain in Savanna, Illinois.

Window Corporation Sales, Inc., New York, N. Y. announces the election of P. Schuyler Van Bloem as president.

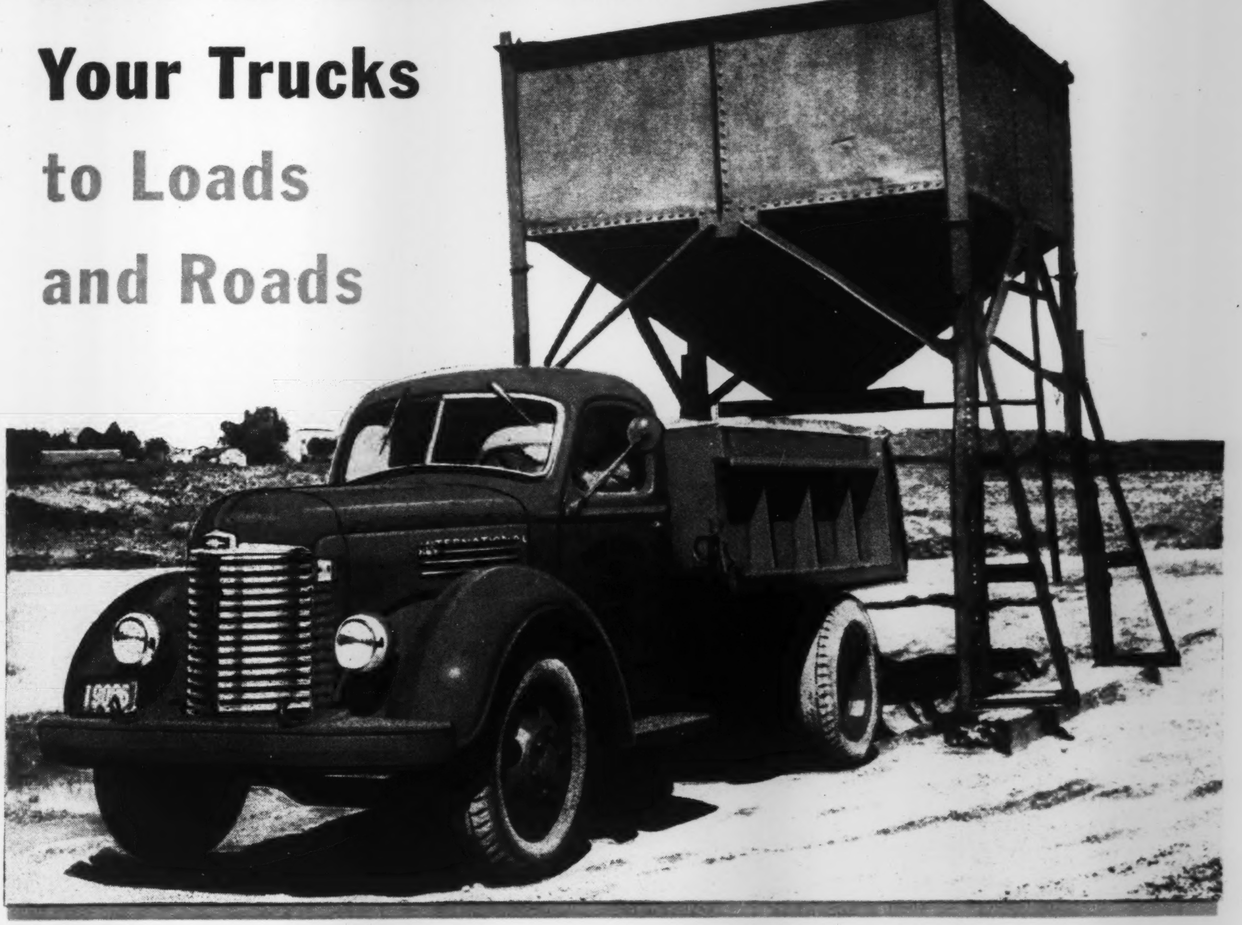
L. L. DeWolf has been named superintendent of marine erection for the Babcock & Wilcox Co., Barberton, O., succeeding M. Nielson, who becomes production superintendent of the Barberton works.

According to a recent announcement, the post of vice president in charge of sales of the Joy Manufacturing Co., Pittsburgh, Pa., has been filled by E. M. Platts.

Keystone Asphalt Products Co., a division of the American-Marietta Co., has made the following appointments: James E. Poole has been made sales manager of the paving products division; Bryant W. Pocock has been named research director; William C. Allen of Dallas and Merle L. Cripe of Chicago will serve airport, highway, and building material users throughout the East, Midwest, and Southwest.

Conscious of the important role which the building industry must play if na-

HOW INTERNATIONAL *Specializes* Your Trucks to Loads and Roads



This first step is an analysis of your hauling problem by your International Dealer or Branch.

This analysis includes type of load; method of loading; terrain and grades; and length of hauls.

The amount of payload practicable for your trucks then is determined by the exclusive International Truck Point Rating System.

Your Internationals then are *specialized*—engine power, transmissions, axle ratios and other units and attachments—to fit your trucks to your jobs.

What does this *specialization* add up to?

1. Ability to do *your* hauling jobs right. 2. Dependability. 3. Economical operation. 4. Low maintenance. 5. Long truck life.

The International Truck Line is the most complete line built. It includes 22 basic models that *specialize* into more than 1,000 different types of trucks. Gross weight ratings are from 4,400 to 90,000 pounds.

For details of International Truck *specialization,* and analysis of your jobs by the International Point Rating System, consult your International Dealer or Branch.

Motor Truck Division
INTERNATIONAL HARVESTER COMPANY
180 North Michigan Avenue Chicago 1, Illinois

40TH ANNIVERSARY OF INTERNATIONAL TRUCKS
1907-1947—Forty years of International Truck Service to Industry, Commerce, Agriculture

INTERNATIONAL

Tune in James Melton on "Harvest of Stars" Sunday! NBC Network.

INTERNATIONAL *Trucks*

NO WONDER I COULD SEE RIGHT THROUGH THEIR PLANS THEY'RE ON PEL-X! . . . THE BETTER TRACING CLOTH
CROWN JEWELS ARE HERE

Naturally you want a tracing cloth that's *truly* transparent — for greater speed, accuracy and minimum eyestrain. That's why you'll just naturally want to use PEL-X Tracing Cloth all the time, once you try it.

But Transparency isn't the only reason for the popularity of this tracing cloth. It also gives you maximum erasability with minimum feathering. Why not try PEL-X — now, today? PEL-X, water-repellent, white pencil tracing cloth is at your dealer's *now*.

TRANSPARENT

WITH A CAPITAL "T" FOR TRULY

FOR BETTER PLANS . . . Better Plan on PEL-X Tracing Cloth

WHITE PENCIL PEL-X WATER REPELLENT TRACING CLOTH

Current Holliston Production includes: TRACING CLOTHS, COATED and IMPREGNATED FABRICS, INSULATING CLOTH BASE, SEPARATOR CLOTHS, MAP CLOTH, PHOTO CLOTH, REINFORCING FABRICS, SIGN LABEL and TAG CLOTHS, BOOKBINDING CLOTHS, SHADE CLOTH.

THE HOLLISTON MILLS, INC. Norwood, Mass. CHICAGO • NEW YORK

EARLE OPERATING MACHINERY IS
Trouble-Free!

OPERATING machinery for bridge installations, dams, locks and gates should be dependable and positive in action above all else. Earle "oversize" construction and automatic lubrication minimize wear and provide year after year service with little or no maintenance. Backed by years of experience, Earle produces operating machinery that is known as "trouble-free" by bridge and water works engineers who specify it.

Our specialists will gladly work with you to solve your gear or machinery problems—get in touch with us now. If you want further information first, send for our NEW catalog containing Earle operating machinery. The EARLE GEAR AND MACHINE CO., Main Office: 4717 Stenton Ave., Phila. 44, Pa.; Sales Offices: 149 Broadway, N. Y. 6; 901 Davis Ave., Pittsburgh 12, Pa.

INCORPORATED IN EARLE OPERATING MACHINERY EARLE GEARS

tional low-cost housing is to be achieved, the **Essick Manufacturing Co.**, Los Angeles, Calif. has announced an immediate reduction ranging up to 14 per cent in the price of its equipment. The company, which manufactures tilting concrete mixers, plaster and mortar mixers, hoists, portable road rollers and various other items essential to the construction industry, has taken this step without lowering wages or reducing personnel.

Iron & Steel Products, Inc., Chicago, Ill. dealers in used railway equipment, machinery, relaying rails and allied lines, have appointed Basil Fenn-Anstruther representative in California, Nevada, and Arizona, with headquarters at 416 West Eighth Street, Los Angeles 14, Calif.

Three changes in personnel of district offices of **SKF Industries, Inc.** are announced, including appointment of Roy C. Norton, Jr., as a field engineer in the Hartford, Conn., district office; the transfer of I. J. Torkelson, field engineer, from Chicago to Milwaukee, and appointment of R. M. Parrish to the sales staff of the Portland, Ore., district office.

Edwin V. Duffy and Opha Lee Rogers have been promoted to assistant sales managers of the **Pennsylvania Rubber Co.**, it was announced recently. R. J. Scott has been promoted to service manager.

L. E. Bartlett, formerly connected with the Chicago sales office of the American Lumber and Treating Co., has joined T. R. Miller Mill Co. with headquarters at Brewton, Ala. A program of expansion, which will practically double the present capacity of the Miller treating facilities, is now in progress.

The final step in the expansion program of the air conditioning division of the **R. B. Rogers Companies, Inc.** has been completed with the announcement that the company is moving from its New York plant to a larger modern factory at Sanford, N. C.

The following personnel changes have been made at the **Twin Disc Clutch Co.**, Racine, Wis.: C. F. Mohrbacher, assistant sales manager of the Racine division; A. E. Young, district manager of the West Coast territory; E. H. Bennett, district manager of the Eastern territory; W. L. Dizon will continue his association with the Newark office as consulting sales engineer; J. B. Jenkins, district manager of the Michigan territory; P. G. Tyrrell, assistant district manager in the territory served by the new Los Angeles office; P. W. Wahler, assistant district manager in the territory served by the Seattle factory branch.

What was perhaps the first Latin-American sales and service conference to be conducted by an American construction equipment manufacturer, attended by the key sales personnel of the manufacturer and its Latin-American dealers, was held recently at Caracas, Venezuela by the LAPLANT-CHOATE MANUFACTURING CO., INC., of Cedar Rapids, Iowa.

DESMOND GAMBLE has been appointed sales representative of McNally Pittsburg Foundries, Inc., Pittsburg, Kan. He takes charge of all territory in the western half of the country.

Doctor of Humane Letters degree was conferred upon E. J. THOMAS, Goodyear Tire & Rubber Co. president, at the 94th annual commencement exercises of Heidelberg College in Tiffin, Ohio.

THE HART REDUCTION PULLEY CO., Milwaukee, Wis., has taken over the manufacture and sale of the reduction pulley. It will be in production in from two to three months on three sizes of pulleys.

DON E. FRICKER, former advertising manager of the Le Roi Co., Milwaukee, has been appointed assistant advertising manager for Heil Co., Milwaukee.

CHARLES E. NELSON, former director of purchases and production planning at Waukesha Motor Co., Waukesha, Wis., has been appointed assistant to the president, James E. De Long, and will continue his other duties.

Contract for construction of INTERNATIONAL HARVESTER Co's new motor truck sales and service branch in Milwaukee has been awarded the Permanent Construction Co., of Chicago. Construction of the new branch will begin immediately on a 7½-acre site acquired some time ago by Harvester.

Four new personnel assignments within the distribution division of the CUMMINS ENGINE CO., INC., Columbus, Ind., have been announced: S. J. Coffey has been appointed manager of regions; Bryon A. Duling manager of engine distribution with headquarters at Columbus; Raymond Boll assistant manager of the Cleveland region; W. C. Phillips assistant manager of the Southeastern region.

Production of hardboards will be increased substantially when MASONITE

Fixed Price
SALE
OF U. S. GOVERNMENT-OWNED
SURPLUS
IN HAWAII

Contractor's
EQUIPMENT

From this half-million dollar selection, including many a "hard-to-get" item, you may be able to buy just the equipment you need—at a substantially reduced price!

There's far too much equipment to list here in detail. But this random selection may give you a brief idea of the type of material up for sale. Bulldozer tractors and cranes, for instance. Pressure pumps, pile drivers, road rollers and drills of all types. Winches, loading buckets, graders—the list could go on and on.

Would you like to buy any such items as these? Then let us send you further details. Act now and you will have ample time to make an inspection well in advance of the dates of sale (see listing below).

HERE ARE THE DATES OF SALE:

1. *September 22,* U. S. Government Agencies.
2. *September 23 through September 29,* World War II Veterans, purchasing for own use.
3. *September 26 and September 29,* World War II Veterans, purchasing for resale.
4. *September 30,* Federal Works Agency, purchasing under Public Law 697, and the Reconstruction Finance Corporation, purchasing for resale to small businesses.
5. *October 1,* the States and Territories and local governments and their instrumentalities.
6. *October 2,* Non-profit institutions.
7. *October 3 through October 21,* Marine Dealers and Exporters.

FOR FURTHER DETAILS:

write, telephone or wire for **Sales Circular No. 319.** Copies may be obtained at the following W.A.A. Offices:

- Washington Office of Disposal for U. S. Territories and Possessions
- Territorial Regional Offices in Alaska, Puerto Rico and Hawaii
- W.A.A. Customer Service Centers or other Offices in Principal Cities
- Export Branches of the following offices: Los Angeles, San Francisco, Seattle, New York, Philadelphia, Boston, Chicago, New Orleans

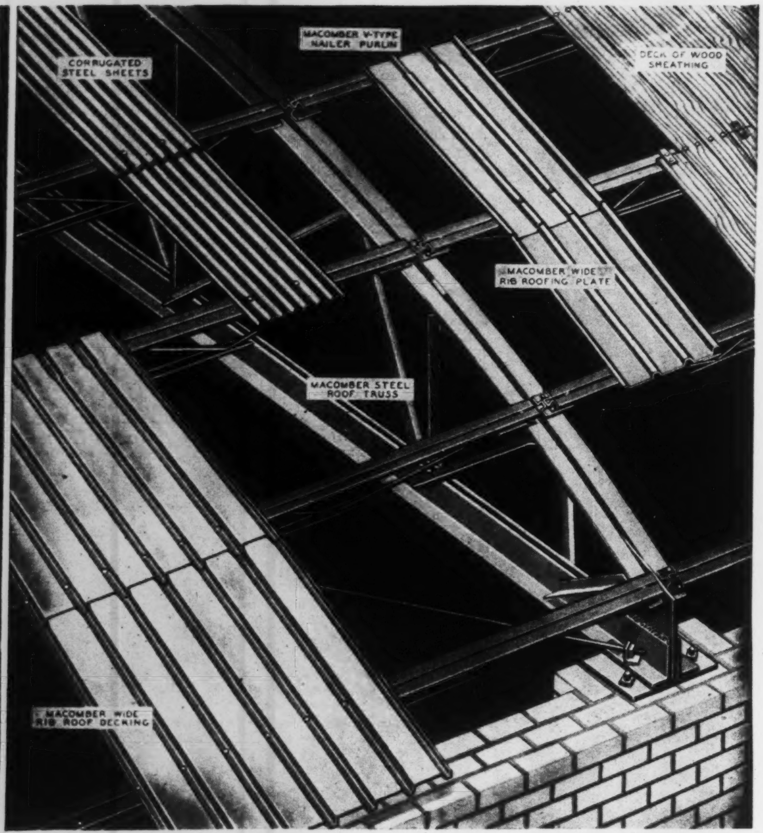
EXPORTERS: *Your participation in this sale is solicited. Inquiries regarding export control should be referred to the Office of International Trade, Department of Commerce, Washington, D. C.*

WAR ASSETS ADMINISTRATION

GOVERNMENT WAA SURPLUS

1347

OFFICE OF DISPOSAL FOR U. S. TERRITORIES AND POSSESSIONS
WASHINGTON 25, D. C.


PATENTS PENDING
CORRUGATED STEEL SHEETS
MACOMBER V-TYPE NAILER PURLIN
DECK OF WOOD SHEATHING
MACOMBER WIDE RIB ROOFING PLATE
MACOMBER STEEL ROOF TRUSS
MACOMBER WIDE RIB ROOF DECKING

For Better Structural Design –
For Fast, Economical Construction use . . .

Macomber All Steel V-Type Nailer Purlins. Shown above are various types of roof decking nailed directly to V Purlins. Specify them for short-cuts to occupancy from standard steel joist loading tables. This modern aid to building is also available in V-type Floor Joists and Studs. For further information write us.

STANDARDIZED • SERVICE IN STEEL • CONSTRUCTION
MACOMBER
CANTON OHIO

MACOMBER
CANTON • OHIO
MEMBER OF THE STEEL JOIST INSTITUTE

PREHY GROUTERS— WEBER SYSTEM

New indispensable Equipment for Contractors, Railroads, Mines and all public and private Construction Departments.

Plastic and Fluid Pressure Grouting, Pneumatic Concrete Construction, Railway Track and Soil Stabilization, Correction of Structural Deficiencies, Subsiding Foundations, Floors, Drypack Concrete and many other practical uses.

Write for complete information

The Prehy Co., Inc.
420 LEXINGTON AVE
NEW YORK 17, U.S.A.

CORP. puts a new mill unit into operation in the near future at its Laurel (Miss.) plant. Opening of the new unit will supplement the output of three units already in operation and provide jobs for about 400 additional employes.

CONDENSER SERVICE & ENGINEERING CO., INC., announce the opening of a fully equipped plant for metal spray, including building up of worn shafts and the like, at 601 Newark St., Hoboken. N. J. The company has been engaged in metal spray work for the past 15 years.

GEORGE H. GLEESON, manager of water meter sales for the Pittsburgh Equitable Meter division, Rockwell Manufacturing Co., Pittsburgh, Pa., has announced that volume production has again been attained in the manufacture of the well-known line of Pittsburgh Imo meters. The Imo Type 2 meter is manufactured by the Pittsburgh concern under license from Aktiebolaget Imo-Industri, of Sweden. It is of the rotary, screw-propulsion type.

A large oil painting of JULIUS P. HEIL recently was unveiled at Wisconsin's capitol in Madison. The portrait was the gift of friends who were associated with Mr. Heil during his two terms as governor. Mr. Heil is chairman of the board of The Heil Co., Milwaukee, Wis.

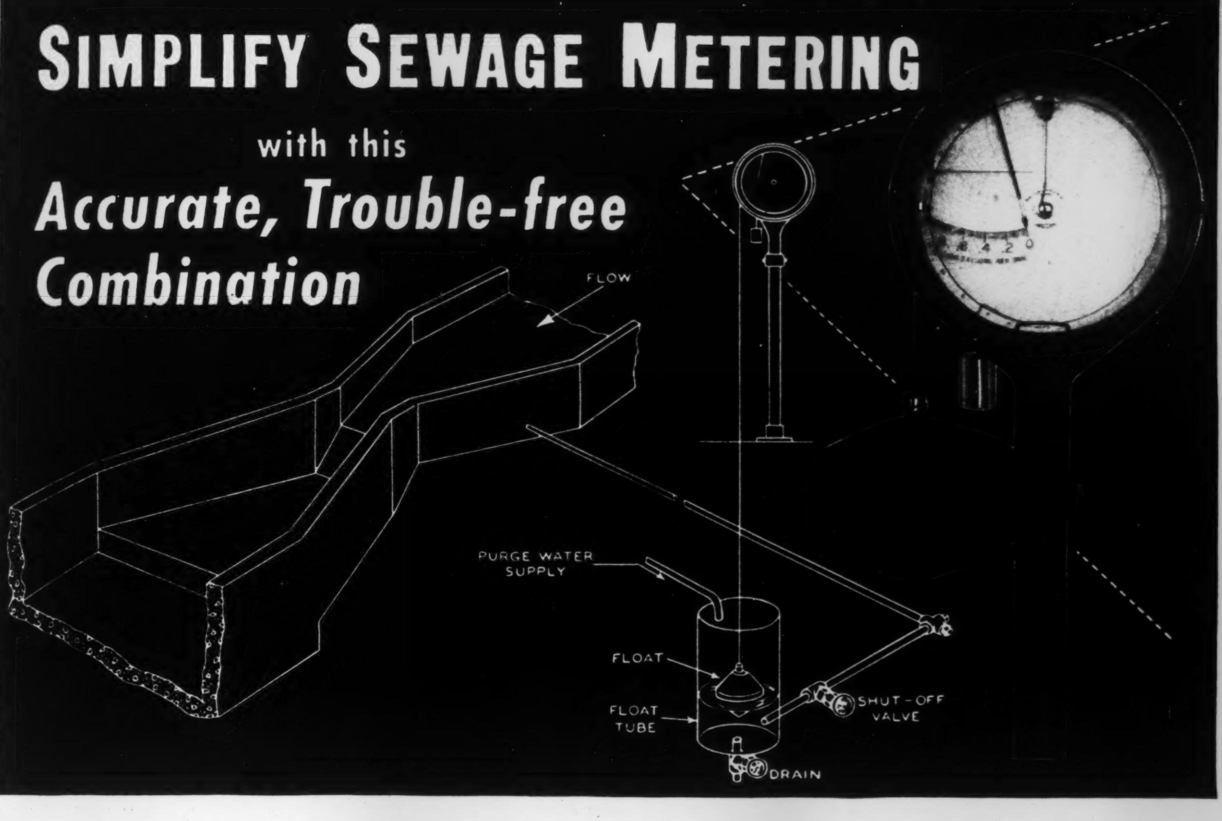
J. S. TURNER, formerly retail manager of International Harvester Co. at Little Rock, Ark. has been appointed assistant manager at Wichita, Kan. motor truck branch.

THOMAS B. MOULE, who served as assistant director of sales in the Los Angeles office of the Plombe Tool Co. for the past three years, has been assigned to supervise Plomb's expanded sales organization in the eastern half of the United States. His headquarters temporarily will be at 549 W. Washington St., Chicago. Ill. Jack G. Allen will take over the duties previously handled by Mr. Moule and supervise the export department.

At a recent meeting of the board of directors of the STERLING ENGINE CO. of Buffalo, N. Y., James B. Porteus of Bronxville, N. Y., was elected to the board and named president. Mr. Porteus, who succeeds Addison F. Vars, was formerly with the Westinghouse Electric International Co. in charge of distribution in Brazil and subsequently in northern Latin America. Mr. Vars was elected Chairman of the Board of Directors effective Nov. 1. George M. Ebert continues as executive vice-pres-

SIMPLIFY SEWAGE METERING

with this
Accurate, Trouble-free Combination



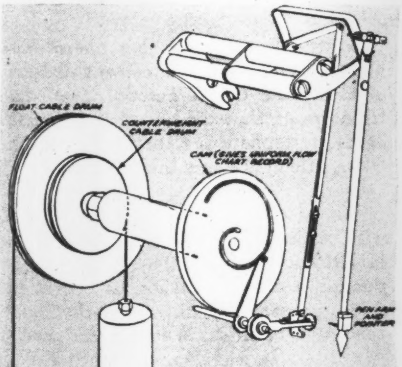
This Combination of Parshall Flume and Foxboro Weir Meter offers many labor-saving, money-saving advantages. Any contractor on the job site can construct the flume and install the instrument. And there's little or no maintenance required on the part of the operator. It records continuously and directly in UNITS OF FLOW. No costly purge system or daily cleaning! It's the simplest accurate system for metering sewage.

The Foxboro Weir Meter is highly regarded for accuracy and dependability, yet requires no fussy servicing. Its flow measuring mechanism is extremely simple—gear trains and multiplying linkages are eliminated. The bakelite cam which translates liquid level into flow is cut from a template ten times the size of the cam to assure tool-making precision. The hardened stainless steel follower is so designed that it will always ride exactly in the center of the groove regardless of wear—assuring no appreciable change in accuracy over a long period of time.

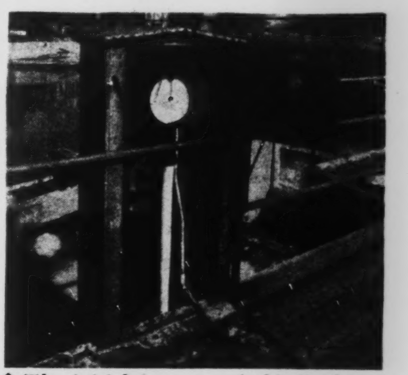
Other features of this Foxboro Weir Meter include micrometer zero adjustment on cable drum to aid you in placing meter in operation; positive protection against overrange in case of storms; weatherproof and corrosion resistant case and mechanism. A direct-reading integrator aids in determining total flow. No complicated multipliers; ciphers added for some ranges.

Write for Bulletin A-298-1. Engineers will also be interested in our flow and capacity curves on flumes and weirs. **The Foxboro Co., 142 Neponset Ave., Foxboro, Mass., U.S.A.**

• • •



◀ *This schematic diagram illustrates the simple accurate Foxboro mechanism for metering and recording directly in flow units, using weirs or flumes.*



▲ *The initial accuracy of this Foxboro Weir Meter measuring tannery waste liquor has been maintained throughout 4 years' service.*

FOXBORO
REG. U. S. PAT. OFF.

DIRECT-READING WEIR METERS

WHAT'S AHEAD IN WELDING?

Look to this Building For Your Answer -

This is the unusual new laboratory of the Air Reduction Sales Co., at New Providence, N. J., dedicated to research in and development of new welding processes and equipment.

The structure, erected with Ingalls fabricated steel by the Ingalls Iron Works Co., features all-welded steel frames, reinforced concrete foundations and floors, and brick walls with continuous steel-sash windows.

WHAT'S AHEAD FOR YOU?

If you have a structural problem, dependable Ingalls fabricated steel may help solve it. Ingalls steel is highly economical, comes ready to erect in exact accordance with specifications. Let us quote on your structural steel needs, whether large or small.

INGALLS STEEL

THE INGALLS IRON WORKS CO., THE INGALLS SHIPBUILDING CORP., The Steel Construction Co., Birmingham Tank Co. Offices at BIRMINGHAM, Pittsburgh, New York and New Orleans. Shipyards at Pascagoula, Miss., and Decatur, Ala. Fabricating plants at Birmingham and Pittsburgh.

ident and comptroller. The Sterling Engine Co. manufactures diesel and gasoline engines for marine and industrial use.

THE HEIL CO., Milwaukee, Wis. announces the appointment of Don E. Fricker, assistant advertising manager.

ROBERT C. KOEHRING has been appointed manager of the portable products division of the Herman Nelson Corp., Moline, Ill., manufacturers of heating and ventilating products. He will coordinate the activities of all departments of the company to further the development and marketing of its line of portable products.

In the interest of centering manufacturing facilities on its principal lines, GARDNER-DENVER Co. has sold its governor business to the Wiebmer Machine Shop of Qunicy, Ill. Gardner-Denver will henceforth concentrate on its expanding business in rock drills, air compressors, pumps, etc.

E. HAROLD LUSTY is assistant to the president in charge of sales and advertising for the Good Roads Machinery Corp., Detroit, Mich.

HAROLD C. ANDERSON, a graduate of the engineering school at Iowa State College, who joined the Thermoid Co. in 1945, has been elected vice-president of research engineering and development of the company at Trenton, N. J.

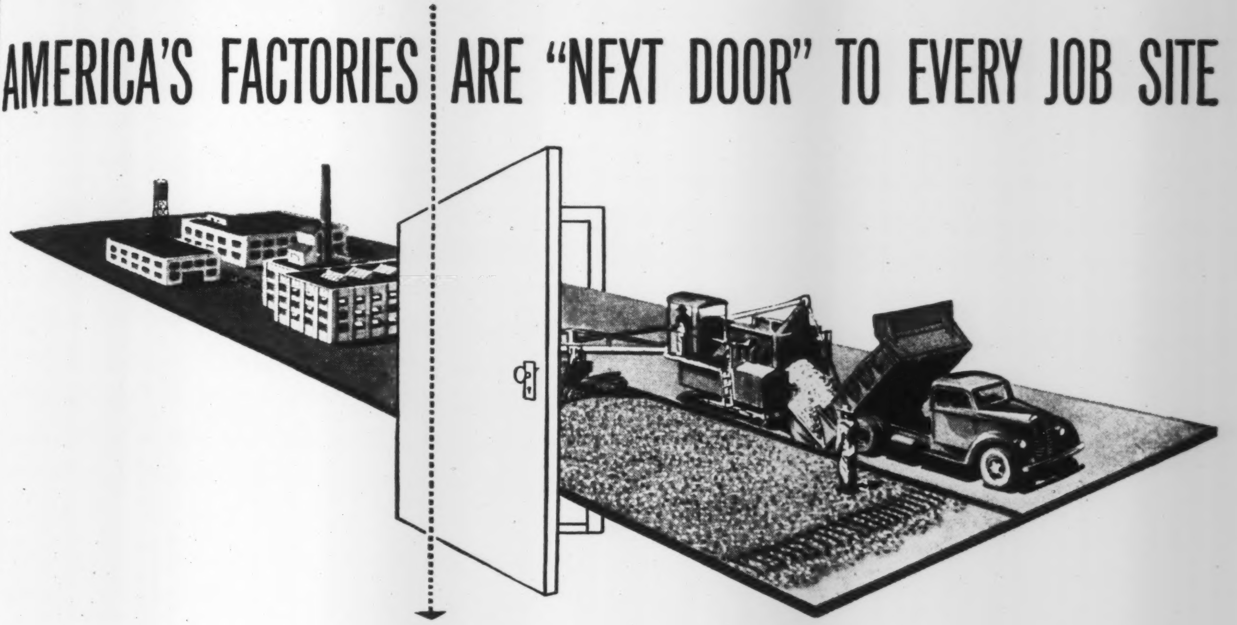
L. B. FOSTER Co. has opened offices and warehouses in Houston, Texas, for prompt shipment of steel products. Jerome B. Strauss is manager, with offices Electric Bldg. 1016 Walker Ave.

JOHN WILLIAMSON has been appointed manager of the cement division of Cataphote Corp., Toledo, Ohio, distributors of Darex AEA, air entraining agent. Cataphote is state distributor for Ohio, Mich., Indiana and Kentucky.

WILLIAM C. KRECKLOW, who started with Allis-Chalmers, Milwaukee, Wis., in 1910 as an office boy, is now production control manager of the West Allis general machinery works, succeeding Harold A. Wallace, resigned.

GOODYEAR TIRE & RUBBER Co's mechanical goods division reports these sales organization shifts: R. E. Pauley district manager at Pittsburgh, Pa., becomes sales manager of the molded goods plant at St. Marys, Ohio, being succeeded by Robert B. Warren, who has been eastern railroad sales manager at New York, Howard T. Martin has been named district manager of mechanical goods sales at Dallas, Tex.

AMERICA'S FACTORIES ARE "NEXT DOOR" TO EVERY JOB SITE



THANKS TO THE LOCAL DISTRIBUTOR

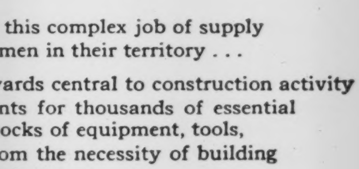
BY ASSURING QUICK, economical delivery of essential construction items when needed, the distributor, in effect, places America's factories "next door" to every job site.

Here's how distributors are accomplishing this complex job of supply with maximum economy for construction men in their territory . . .

- Distributors maintain warehouses and yards central to construction activity as convenient, well-stocked assembly points for thousands of essential construction items. Distributors' central stocks of equipment, tools, materials, and supplies free contractors from the necessity of building cumbersome and costly stock piles at the job site.
- Distributors anticipate routine as well as emergency needs of construction men in their territory. Expensive time lags involved in ordering and obtaining delivery of products from distant, scattered sources are eliminated.
- Distributors assemble and store items at the request of individual contractors.
- Distributors facilitate procurement of hard-to-find items through their intimate knowledge of sources of supply.
- Contractors have the advantage of dealing with one source instead of many. They benefit from distributor skill in ordering, following up orders, and expediting delivery. They save the expense of handling manifold purchase orders, invoices, and checks.

When it comes to assembling the products of far flung factories within convenient distance of the job site, it pays to deal with your local distributor. Work with him from start to finish on every construction job.

Make Distributor's Headquarters
Your Service Headquarters



No. 3 in a series of advertisements sponsored by ENGINEERING NEWS-RECORD and CONSTRUCTION METHODS showing how distributor services aid economical construction

Serving the City of QUITO, ECUADOR

In Quito, Ecuador, almost astride the equator at an elevation of over 9 thousand feet, 5 Layne Well Water units are now producing 2,280,000 gallons of water per day. Highly pleased with the proven efficiency, low operating cost and outstanding quality, Quito's city officials have just ordered another 5 Layne Wells and Pumps for another section of the city.

Designed and installed by U.S. trained engineers, Quito's complete Well Water Supply will be equal in every way to the finest on the North American Continent.

Layne Well Water Systems are universally favored the world over. They are designed and built to give the utmost in long life and operating satisfaction. Layne has many such installations in the Latin American countries, all of which are fully measuring up to their reputation of high efficiency and low operating cost.

If your city, railroad, factory, packing plant, ice plant, or irrigation project is in need of more water where production cost per million gallons must be extremely low, you should have complete facts about Layne Well Water Systems and Layne Vertical Turbine Pumps. For literature, address

LAYNE & BOWLER, INC.
General Offices, Memphis 8, Tennessee

- pumps for wells, lakes, rivers, reservoirs, irrigation—or for any use where large quantities of water must be produced at low cost. Sizes range from 40 to 16,000 gallons per minute. Write for Layne Pump Catalog.

LAYNE
WELL WATER SYSTEMS
vertical turbine pumps

AFFILIATED COMPANIES: Layne-Arkansas Co., Stuttgart, Ark. ★ Layne-Atlantic Co., Norfolk, Va. ★ Layne-Central Co., Memphis, Tenn. ★ Layne Northern Co., Mishawaka, Ind. ★ Layne-Louisiana Co., Lake Charles, La. ★ Louisiana Well Co., Monroe, La. ★ Layne-New York Co., New York City ★ Layne Northwest Co., Milwaukee, Wis. ★ Layne-Ohio Co., Columbus, Ohio ★ Layne-Pacific, Inc., Seattle, Wash. ★ Layne-Texas Co., Houston, Texas ★ Layne-Western Co., Kansas City, Mo. ★ Layne Western Co. of Minn., Minneapolis, Minn. ★ International Water Supply Ltd., London, Ont., Can. ★ Layne-Hispano Americana, S. A., Mexico, D. F.

Manufacturers' Publications

Highway Trestle Bridges—(Booklet) Gives results of studies by engineers of large number of bridge designs, with complete instructions for ordering "made-to-measure" bridge and 8 pp. of blueprints showing combinations that will take care of normal bridge needs. *—Wood Preserving Division, Koppers Co., Inc., Pittsburgh, Pa.*

Office Lighting—(18-p. book, with promotional material inserted) A check list of points to be covered in planned lighting program for offices. *—Edison Electric Institute, 420 Lexington Ave., New York 17, N. Y.*

Tile Setting—(Basic textbook) Contains 19 lessons on essentials of tile setting for floor, wall and specialty work. Priced at $2.75, it is available free to apprentices and trainees and to tile contractors employing them.*—Tile Council of America, 10 E. 40th St., New York 16, N. Y.*

Road Repair Equipment—(8-p. folder) Describes steam heater, supply tanks, pressure distributors, and highway brooms.*—Littleford Bros., 457 E. Pearl St., Cincinnati 2, Ohio*

Airbrushes—Two bulletins and 4-p. folder) Describe and illustrate multiple-head and automatic airbrushes, giving price list and directions for operations and care.*—Paasche Airbrush Co., 864 Pape Ave., Toronto 6, Ont., Canada*

Welder-Generator Combination — (4-p. bulletin) Describes double-duty unit that provides 300-amp. d.c. arc welder plus 6 or 12-kw. a.c. auxiliary generator. Another 4-p. folder tells about Weldmobile, self-propelled arc welder with multi-range and remote control.*—Hobart Bros. Co., Box DM759, Troy, Ohio*

Monolithic Construction — (8-p. brochure) Gives complete description of how Tournalayer operates to serve as form and delivery vehicle for precast houses. It shows how various combinations of basic, monolithic units may be used to provide any size or style home.*—R. G. LeTourneau, Inc., Longview, Tex.*

Wall Framing—(Three 7¼x9½-in. blueprints) Illustrates stud walls without bracing but with diagonal sheathing; with let-in bracing and

Now available in an up-to-date Second Edition

The reference aids you'll *need* for the big jobs ahead!

With the construction jobs that lie ahead for every engineer, it is only up to you to assure yourself of superior workmanship—ensure your work of the finest structural qualities—by providing yourself with this up-to-the-minute revision of the famous Hool and Kinne Library—the books which for years have been providing structural engineers with the facts they need on every problem concerned with the design and construction of civil engineering structures.

6 volumes
3763 pages
2719 illustrations
63 contributors

make this the most complete compilation of structural engineering data ever published.

HOOL AND KINNE'S
STRUCTURAL ENGINEERS' Library

Revised by R. R. ZIPPROOT,

And prepared by a staff of sixty-three well-known engineers, each a specialist in his field.

Each one of these six volumes is a complete reference in itself on some aspect of structural engineering. The library:

COVERS the how and why of foundation and substructure design and construction, the general theory of structural members, the detailed design of such members and the design of their connection with other members.

EXPLAINS the principles of statics, reactions moments and shears in beams and trusses, influence lines, methods of computing stresses in lateral trusses and portal bracing.

GIVES details of design and construction of steel timber and concrete structures of all types.

We invite you to inspect these books for yourself, because we know that that is the one way you can realize their true value to you and to the jobs that you do. You want to back up your own knowledge with sure, easy-to-get facts, and you want to make your workmanship worthy of your best time and effort. Therefore, the best investment you can make is to add to your own experience the tested working aids given in this dependable reference library.

Send for all six books, and allow them to go to work for you on your toughest problems.

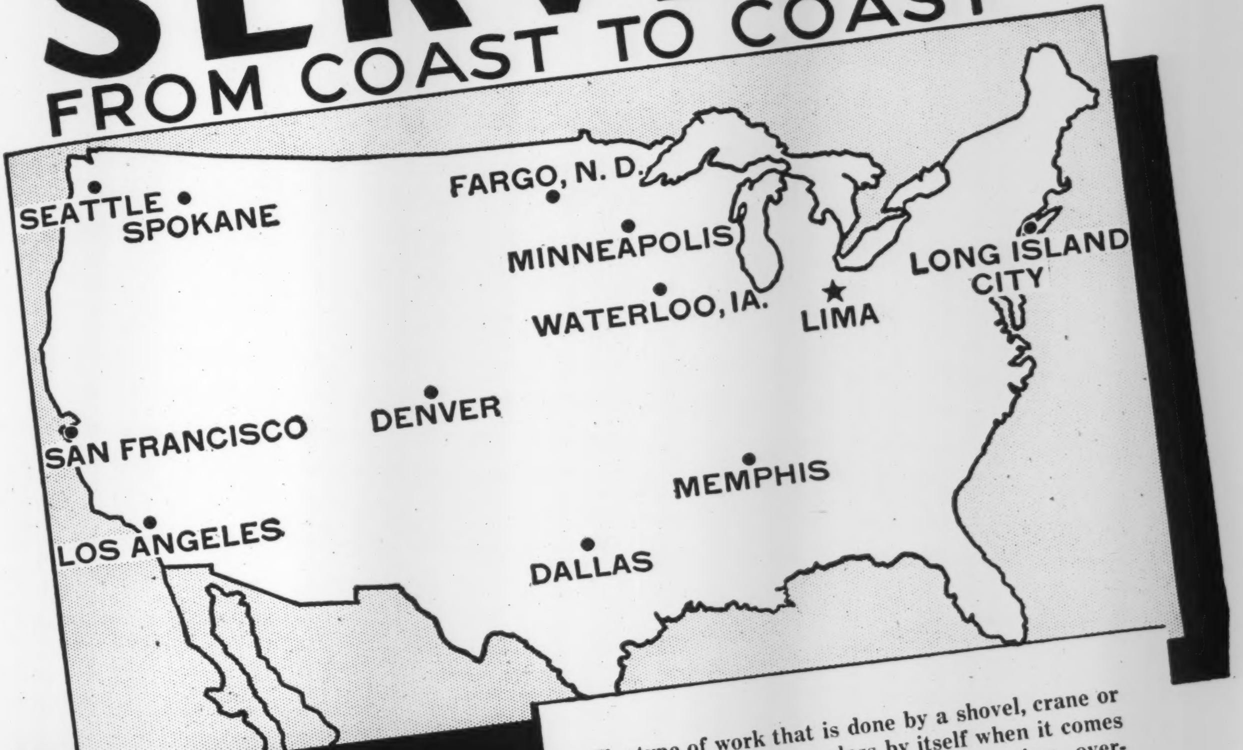
SEND THE COUPON FOR FREE 10-DAY TRIAL EXAMINATION

McGRAW-HILL BOOK CO.,
330 W. 42 St., New York 18, N. Y.

You may send me Hool and Kinne's Structural Engineers' Library for my inspection. If the books prove satisfactory, I will send $4.75 in 10 days and $5.00 per month until I have paid the price of the books, $29.75. If the books are not what I want, I agree to return them postpaid within 10 days of receipt.

Name ....
Address ....
City and State ....
Company ....
Position NR-9-4-47
(For Canadian price, write: McGraw-Hill Co. of Canada, Ltd., 12 Richmond Street E., Toronto 1)

SERVICE
FROM COAST TO COAST



The type of work that is done by a shovel, crane or dragline places it in a class by itself when it comes to taking punishment. Heavy excavating, overloading, improper care all take their toll. We at LIMA go the limit to build equipment that will withstand a normal amount of rough usage but regardless of how well a machine is built, there are times when parts must be replaced. Our interest in a customer does not end with the sale and delivery of a shovel, crane or dragline. We are ever ready to serve you at a moments notice as long as the machine is in service. A complete record of each machine we build is preserved so that when a part is ordered the customer can be sure that it will fit accurately. Parts are shipped the same day the order is received whenever possible. Special attention will be given to your request for parts service from headquarters located in the cities shown on the above map.

LIMA

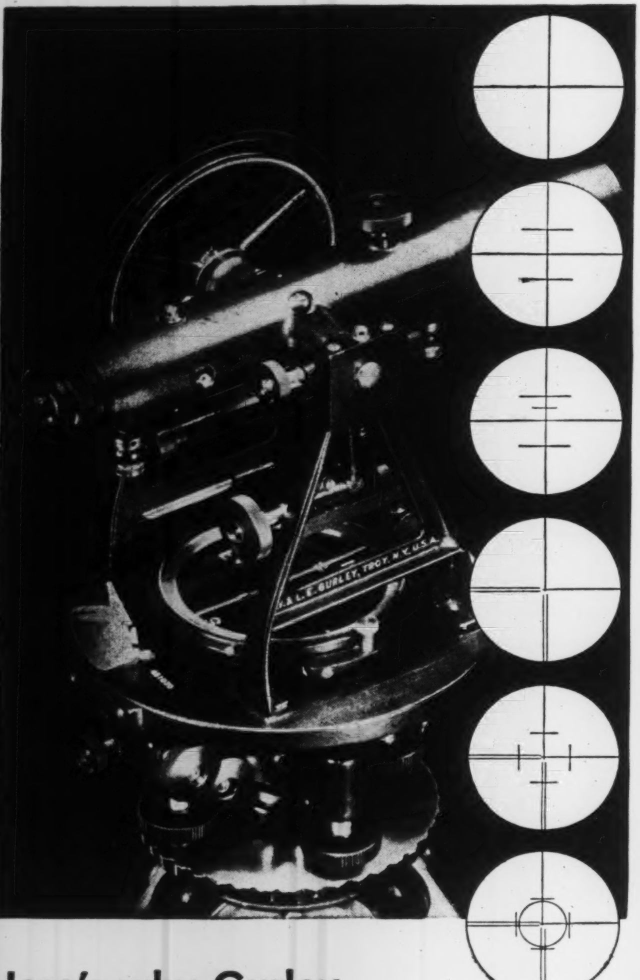
LIMA LOCOMOTIVE WORKS, INCORPORATED

Shovel and Crane Division • Lima, Ohio, U. S. A.

THE LIMA DIAMOND

FOR OVER 75 YEARS AN EMBLEM **LIMA** OF QUALITY WORKMANSHIP

Capacities . . . SHOVELS ¾ YARD TO 5½ YARDS • CRANES 13 TONS TO 100 TONS • DRAGLINES VARIABLE



Only Gurley Offers These Improved Reticles

A. Plain cross-lines. For Levels.

B. Cross-lines and stadia lines, spaced 1:100.

E. & F. Quarter-interval stadia lines in upper or lower field, added to "B" for stadia readings of 1:400. For Alidades.

O. Parallel horizontal and vertical lines combined with regular cross-lines.

T. Stadia lines spaced 1:100 horizontally and vertically, added to "O".

S. Solar reticle. A combination of "O" and "T" with a circle 15′ 45″ radius for centering the sun's image.

Here's why Gurley Instruments now feature quick-reading glass reticles . . . exclusively

Study these new reticle patterns. Think of them in the telescope of your new Gurley transit. They'll make your next surveying assignment much easier.

Here's the latest advance in engineering instrument design—*glass reticles* to suit all surveying requirements and climatic conditions, developed by Gurley for added efficiency and accuracy.

Short stadia lines, spaced and ruled at precise intervals, are quickly identified since they do not extend over the entire field of view, as in continuous filament reticles. There is no chance of confusion with the regular cross-lines, nor can they be affected by moisture.

Several reticle pattern designs are available in Gurley instruments, from parallel horizontal and vertical lines, combined with cross-lines for triangulation and stellar observations, to solar reticles for centering the sun's image. Besides those illustrated Gurley can provide other patterns and vary the weight of reticle lines to suit your requirements. Gurley's knowledge of optics, lens grinding and specially developed reticle-making equipment assure all-important uniformity of line.

Investigate this sighting method in new Gurley instruments, exclusive with Gurley. Write today for our bulletin No. 50 with its detailed description of the complete line of Gurley products. W. & L. E. GURLEY, UNION PLAZA, TROY, NEW YORK.

GURLEY

Scientific and Surveying Instrument Makers since 1845

Engineering and Surveying Instruments, Hydraulic Engineering Instruments, Standard Precision Weights and Measures, Paper and Textile Testing Instruments, Aeronautical Navigating Instruments, Meteorological Instruments, Reticle Making Facilities.

horizontal sheathing; and with cut-in bracing and horizontal sheathing.—*West Coast Lumbermen's Association, 1410 S. W. Morrison St., Portland 5, Ore.*

Radiant Heating—(42-p. manual) Describes Rayduct, high-ductility pipe for radiant heating installations. It covers general features, basic design and typical applications.—*Bethlehem Steel Co., Inc., Bethlehem, Pa.*

Tandem Roller—(6-p. folder) Describes and pictures Wheeler 3 to 4-ton roller, featuring one-lever steering control.—*Shaw Sales & Service Co., 5100 Anaheim Telegraph Rd., Los Angeles 22, Calif.*

Welding Cutting—(20-p. catalog) Shows comprehensive portion of line of gas welding and flame cutting apparatus with excellent four-color illustrations of major units of equipment. —*Victor Equipment Co., 844-54 Folsom St., San Francisco, Calif.*

Steel Shackle Clamp—(Illustrated folder) Gives specifications for eccentric cam shackle clamp, safety lock clamp, pipe clamp and horizontal cam grip plate clamp for picking up plates and shapes with safety.—*J. C. Renfroe & Sons, 1259 W. State St., Jacksonville 1, Fla.*

Marine and Industrial Hardware—(32-p. catalog) Presents detailed working characteristics of line of wire rope and chain fittings, with tables and charts.—*Thomas Laughlin Co., Portland 6, Me.*

Air Entraining Agent — (20-p. bulletin) Describes Darex "controlled air" and its ability to improve durability of concrete.—*Dewey & Almy Chemical Co., Cambridge, Mass.*

Trencher—(Illustrated bulletin) Describes 200-wheel Trenchliner featuring pivot wheel mounting. Also shows tile-laying chute for speeding placing of tile. Detail photos, drawings and specifications are included.—*Parsons Co., Newton, Iowa*

Plaster-Mortar Mixer—(4-p. bulletin) Describes 6-cu.ft. mixer for use by plaster and mason contractors.—*Koehring Co., Milwaukee 10, Wis.*

Earthmoving — (16-p. booklet) Shows what company's equipment and auxiliary units can do in big and small earthmoving operations, citing applications for dam, airport and housing, road and railroad construction, and other fields.—*Caterpillar Tractor Co., Peoria 8, Ill.*

HERE'S *Suds*

...IN YOUR EYE!

The suds very much in your eye as you look at the photograph above is lubricating oil which foams badly and, if used in valuable equipment, constitutes a hazard to positive lubrication, which can increase maintenance costs.

At Sinclair Laboratories, skilled technicians, like the one shown above, study and test lubricating oils constantly for foaming characteristics. Through research in the study of additives, Sinclair provides anti-foam characteristics and assures positive lubricating film plus maximum heat dissipation for protection against wear and failure.

Through such painstaking research, Sinclair maintains production of lubricants of consistent high quality. Sinclair Laboratories and outstanding research are behind the dependable performance of all Sinclair Lubricants for Industry.

Sinclair Automotive Oils

For Truck, Bus, and Tractor

OPALINE

TBT

OIL

Positive lubrication — Maximum power

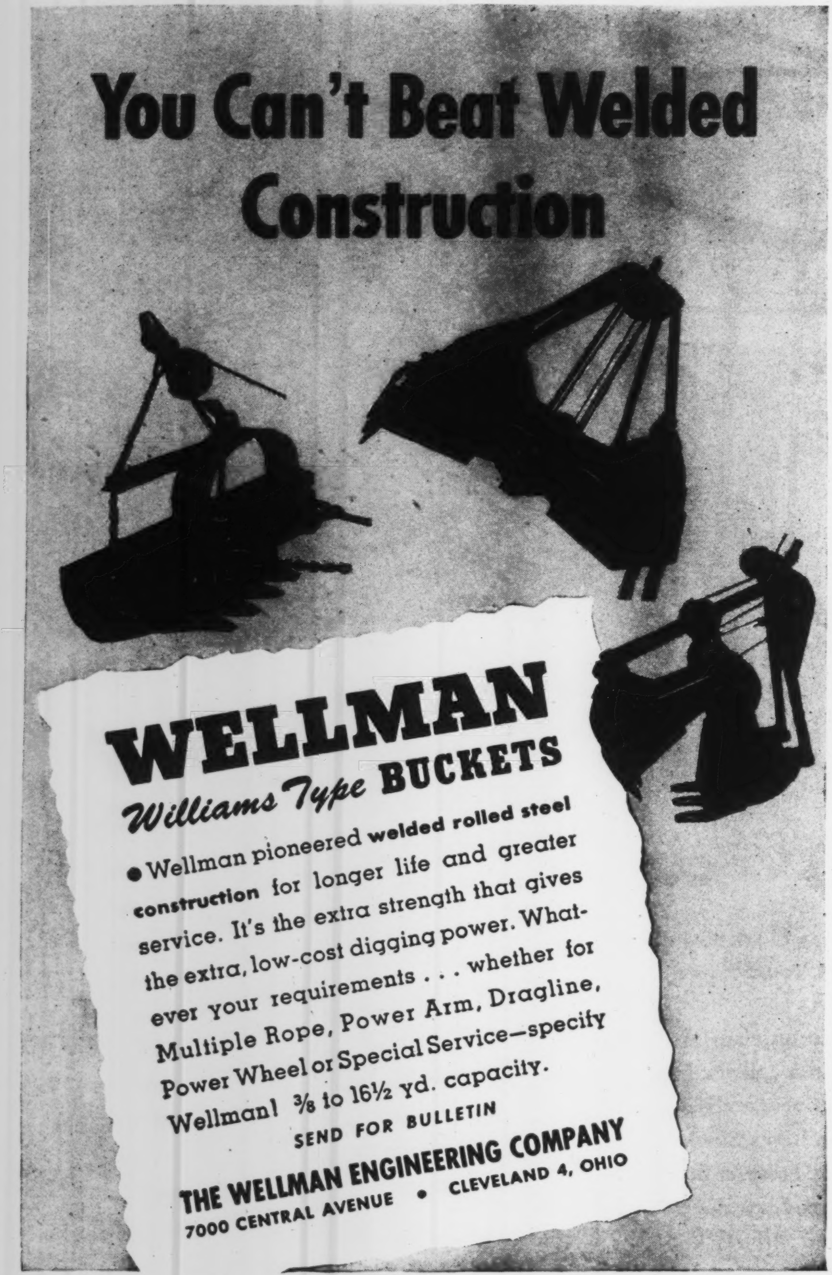
For the long pull, under heavy loads

SINCLAIR REFINING COMPANY • 630 FIFTH AVENUE, NEW YORK 20, N. Y.

SINCLAIR

Lubricants for Industry

FINEST CRUDES + EXPERT RESEARCH and MANUFACTURING CONTROL = OUTSTANDING PERFORMANCE



You Can't Beat Welded Construction

WELLMAN
Williams Type **BUCKETS**

● Wellman pioneered **welded rolled steel construction** for longer life and greater service. It's the extra strength that gives the extra, low-cost digging power. Whatever your requirements . . . whether for Multiple Rope, Power Arm, Dragline, Power Wheel or Special Service—specify Wellman! 3/8 to 16½ yd. capacity.

SEND FOR BULLETIN

THE WELLMAN ENGINEERING COMPANY
7000 CENTRAL AVENUE • CLEVELAND 4, OHIO

1/8"
1/16 Clearance

WELDING CONNECTORS
Saxe System Welded Connection Units for welded assembly

Saxe Units place in position and securely hold together structural parts to be welded.

As used in many welded structures they *eliminate all hole punching*, producing an economical, rigid, safe and quickly erected structural frame.

Write for descriptive literature

J. H. WILLIAMS & COMPANY
Buffalo-7, New York
G. D. PETERS CO., Montreal-2, Canada
Canadian Representatives

"GUNITE"
New Construction—Repairs

Prestressed Tanks	Steel Encasements
Reservoir Lining	Dam Repairs
Pen Stock Lining	Tunnel Lining
Smoke Stack Lining	Sewer Repairs

Disintegrated Concrete Abutments Renewed

Repairs To All Types of Masonry

Write for our Bulletins

PRESSURE CONCRETE CO.
Engineers & Gunite Contractors
1st Nat. Bank Bldg. FLORENCE, ALA.
6 Avenue B NEWARK, N. J.

News of the Week

(*Continued from page 77*)

State and city agree on Philadelphia betterments

Pennsylvania and Philadelphia have agreed on a new multi-million dollar traffic and highway improvement program for the city. The state will pay the cost of the program with work scheduled to start this year and go on through 1949 and 1950.

In addition to mapping the new projects, E. L. Schmidt, chief engineer of the State Highway Department and Thomas Buckley, Philadelphia Public Works Director said conferees agreed to speed up projects previously agreed upon. After the city council approves the plans formal city-state agreements will be drawn.

The following new projects have been agreed upon:

Widening of the Levick St. approach to the Tacony-Palmyra Bridge.

Paving of Roosevelt Boulevard from Oxford Circle to Broad St., including the reconstruction of five bottleneck bridges.

Construction of the first links to the proposed Oregon Ave.-Delaware Ave. industrial hihgway on Aramingo and Harbison Ave.

A state highway on 42d St. between Chestnut St. and Chester Ave.

Extension of Oxford Ave. from Veree Rd. to Hasbrook Ave.

Channelization of Moyamensing Ave. from 19th St. to Broad St.

The first section of an improvement on Stenton, Godfrey and Adams Aves. extending from Rising Sun Ave. to Front St.

State and city officials said that work on the Vine St. widening project would start before the end of this year if legal entanglements were cleared.

Director Buckley disclosed that it is hoped to begin work soon on the western end of the Pennsylvania Boulevard project from the Schuylkill River to 32d St.

◆

Illinois to create nine artificial lakes

The Illinois Conservation Department expects to let construction contracts this summer covering nine artificial lakes as the first step in the state-wide system of such lakes authorized by the 1945 Illinois General Assembly.

Director Livingston E. Osborne has estimated the nine lakes will cost about

There's a "Job-Rated" truck like this

...to fit YOUR job, save YOU money!

Take a good look at this truck! It's a "*Job-Rated*" truck—a truck built to FIT a specific hauling job.

This truck has "*Job-Rated*" power—the right one of seven great Dodge truck engines for pulling its load . . . dependably, and *economically.*

It has exactly the right clutch, transmission, springs, frame, rear axle—the right units throughout—for longer-lasting, more dependable service.

Such a truck performs better, enables its owner to give better service to his customers, lasts longer, and saves money.

There's a "*Job-Rated*" truck to fit YOUR job, too!

To get such a dependable and economical truck—simply explain your hauling problems in detail to your Dodge dealer. He will select the right Dodge "*Job-Rated*" truck for YOUR job.

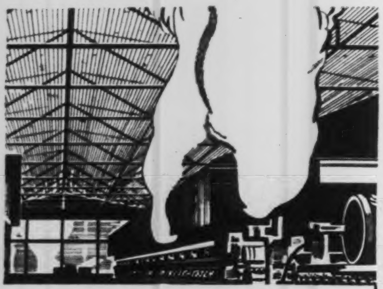
★ ★ ★

Your Dodge dealer is interested in your continued satisfaction: *First,* by selling you a truck that fits your job; *Second,* by giving you dependable Dodge truck service; *Third,* by providing you with truck parts that are identical with original Dodge "*Job-Rated*" truck parts.

DODGE

ONLY DODGE BUILDS "*Job-Rated*" TRUCKS

Fit the Job . . . Last Longer!



This Wood Changed Buying Habits of an Industry

PULP AND PAPER MILLS have a hard time finding construction materials that can withstand their high temperatures and humidities. For example, before the lasting ability of Wolmanized Lumber* was so generally known, they were continually having to replace ordinary wood that had decayed within three or four years.

THEN THEY STARTED to use Wolmanized Lumber for roof planks and timbers, window frames and sash, and elsewhere in the mills. Because this wood is highly resistant to decay and termite attack, the need for replacements in mills using it practically disappeared.

LOWER MAINTENANCE costs result when Wolmanized Lumber is used; service records covering millions of feet, some in use over twenty years, are evidence of this fact. In addition, all of the advantages of wood construction are retained: ease and speed of erection, light weight, resilience, strength, high insulating value, and low first cost.

WOLMANIZED LUMBER is ordinary wood, made long-lived by vacuum-pressure impregnation with Wolman Salts* preservative. It is clean, odorless, and paintable. May we send you more information? Write American Lumber & Treating Company, 1649 McCormick Bldg., Chicago, Ill.

*Registered Trade Marks

Wolmanized

LUMBER

WOLMANIZED AL&T AMERICAN LUMBER & TREATING CO.

$2,389,224. They will be located in Stephenson, Cook, Henry, McDonough, Macoupin, Clark, Fayette, Saline and Jackson counties.

Sites for seven of the proposed lakes, which will range in size from a surface area of 75 acres to 307 acres, have either been acquired by the state or are under a purchase option.

The system of lakes is intended to expand and improve the state facilities for hunting, fishing and other outdoor recreation. Flood and drouth control and rehabilitation of some of Illinois 3,000,000 acres of wasteland are other aims of the new system.

◆

PRIEST DESIGNS CHURCH

At Belle Vallee, Ont., on July 20 the cornerstone of a church to accommodate 800 was laid and construction work continues under the supervision of Father Joseph Grenier, the parish priest, who designed, prepared plans and even drew up the sketches for the interior decoration.

The versatile cleric has only three paid workmen. All the remaining labor is volunteer. Father Grenier himself mixes the concrete and wheels a barrow, stopping now and then to fill his pipe.

Seismological committee to help engineers

Appointment of an advisory committee on engineering seismology to aid in bridging the gap between the fields of the seismology and the structural engineer has been announced by Rear Admiral Leo Otis Colbert, director of the Coast and Geodetic Survey, Department of Commerce.

All members of the committee are outstanding design engineers or college professors who have knowledge of the complexity of the problem. Each of the twelve men constituting the committee was nominated by an engineering or scientific organization. The committee will be formally organized at a meeting to be held soon.

"We in the Coast and Geodetic Survey are seismologists, not design engineers," said Admiral Colbert. "We can provide information concerning the behavior of strong-motion earthquakes, and do so regularly. This information is highly technical and difficult of application in the design of earthquake-resistant structures.

"On the other hand, structural engineers are not seismologists. They are adept in the design of static structures. They take account of numerous static

Electroline FIEGE
Wire Rope
Connectors
ARE DEPENDABLE
ACTUALLY
PROLONG
WIRE
ROPE
LIFE!
½

Simply slip the sleeve over the cable, spread the strands, insert and drive in the plug then apply the socket. See what a solid and permanent joint you have by looking at it through the inspection hole put there for the purpose.

By successfully damping vibration, Electroline Fiege Wire Rope Connectors prevent crystallization and wear . . . forestall failure . . . prolong the life of your wire ropes.

But "proof positive" is in their use. Millions are in constant service. Try them. See your mill supply jobber or write to Electroline — manufacturers of this well-known line of time and trouble saving wire rope connectors.

Electroline Company

4121 S. LA SALLE ST., CHICAGO 9, ILL.

A Few Choice Territories Open for Distributors

GRIFFIN

WELLPOINT SYSTEMS

JETTING PUMPS

SALE — RENT

Distributors

GRIFFIN ENGINEERING CORP.
2016 E. Adams St.
JACKSONVILLE, FLA.

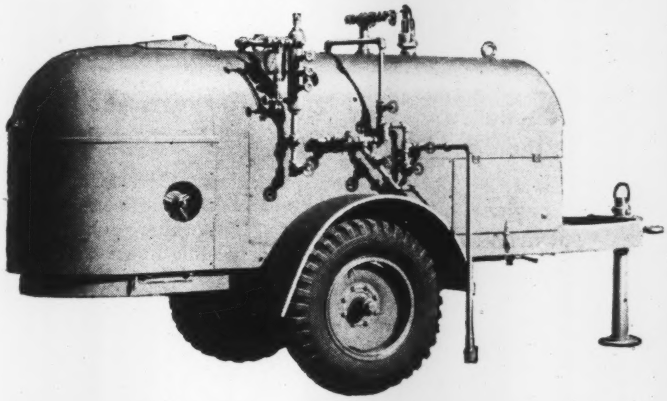
GRIFFIN EQUIPMENT CO., INC.
548 Indiana Street
HAMMOND, INDIANA

GRIFFIN WELLPOINT CORP.

881 EAST 141st ST. • NEW YORK 54, N. Y.
Phones: MElrose 5-7704-5-6

GET YOUR
HOT OIL
ON THE JOB FASTER-WITH
LESS WORK-LESS FUEL-LESS WATER

Cleaver-Brooks Tank-Car Heaters have Dry Steam in Tank Car Coils from a Cold Start in 20 Minutes OR LESS!



Cleaver-Brooks Mobile Tank-Car Heater — Not just a boiler on wheels, but a compact, rugged, highly efficient steam generator — built for a specific purpose. Available in two and three tank car heating capacities. Oil-fired, extra-high heat transfer design, dry-coil steam condensate return under pressure — no water or heat losses. Can also be profitably used for an all purpose unit for steam cleaning, thawing and heating.

THE tank car on the siding is the starting point for fast work on any oiling or bituminous surfacing job. The quicker you get the oil or asphalt up to application temperatures and flowing into the relay trucks or distributors — the faster your work crews can get going.

Cleaver-Brooks tank-car heaters are expressly designed to be shooting steam through tank car coils at 125 lbs. pressure in 20 minutes or less. And they can keep going full tilt all day with a very minimum of attention and work because a Cleaver-Brooks tank-car heater uses less fuel and water. Its extra high heat transfer design means fuel savings; its turbine type condensate return means less water . . . every drop of condensate goes back to the heater and under pressure. The capacity for long hours and tough jobs is built into every Cleaver-Brooks Unit. For detailed information write for bulletin RM-102.

CLEAVER-BROOKS COMPANY
5107 NORTH 33rd STREET • MILWAUKEE 9, WISCONSIN

Cleaver-Brooks PIONEERS AND ORIGINATORS OF

TANK CAR HEATERS . . . BITUMINOUS BOOSTERS . . . AUTOMATIC STEAM PLANTS

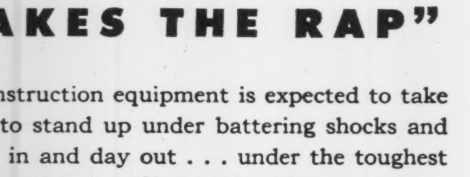
Fluid "TAKES THE RAP"

Heavy-duty construction equipment is expected to take a mauling . . . to stand up under battering shocks and strains . . . day in and day out . . . under the toughest conditions. When there's a Twin Disc Hydraulic Coupling in the power train, the full weight of the shock loads never reaches the driving or driven parts . . . the fluid principle of the Coupling absorbs and cushions the destructive forces that wreck equipment.

This "shock absorption" lengthens the life of engines, cables, gears, booms, buckets . . . reduces "downtime" and maintenance costs . . . makes it easier on operators to handle a rig equipped with a Twin Disc Hydraulic Coupling.

Write today for a copy of Bulletin 136 for the details of the Twin Disc Hydraulic Coupling. TWIN DISC CLUTCH COMPANY, Racine, Wisconsin (Hydraulic Division, Rockford, Illinois).

TWIN DISC
CLUTCHES AND HYDRAULIC DRIVES



SPECIALISTS IN INDUSTRIAL CLUTCHES SINCE 1918

factors, including wind pressures against walls and snow load on roofs. Earthquakes introduce a dynamic factor — vibration. Engineers encounter great difficulty in determining how to make safe allowances for this factor.

"While considerable progress has been made in this direction, maximum results have not been realized because of the failure to close the gap between available seismological information and the means for its application to engineering design. It is mainly to outline a specific means for closing this gap that the Advisory Committee has been formed. It is hoped that there may also result an organization of competent engineers in various localities to make exhaustive field studies of damages from major earthquakes."

To aid the committee in its deliberations the Survey is preparing a summary of research projects conducted to date dealing with the practical application of its instrumental data to the design of structures.

A letter already sent to members of the committee discusses various lines of activity that promise worthwhile results. It expresses the hope that the committee may also succeed in devising a complete procedure for the effective use of seismological data in structural design, and concludes:

"If, because of the complex nature of the problem, this cannot be accomplished by the committee, it is then proposed that the committee exercise the influence of the organization represented to promote the establishment of an Institute for Earthquake Resistant Building Research."

Federal government aids hospital building

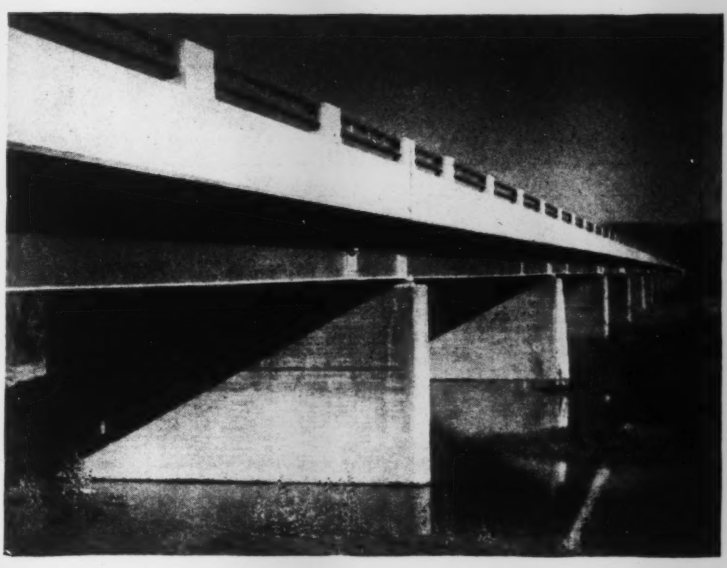
Construction of $225,000,000 worth of hospital and health facilities during the fiscal year of 1948, ending June 30 next year, will be possible under the appropriations act signed by the President on July 8, Thomas Parran, Surgeon General, U. S. Public Health Service, Federal Security Agency has announced.

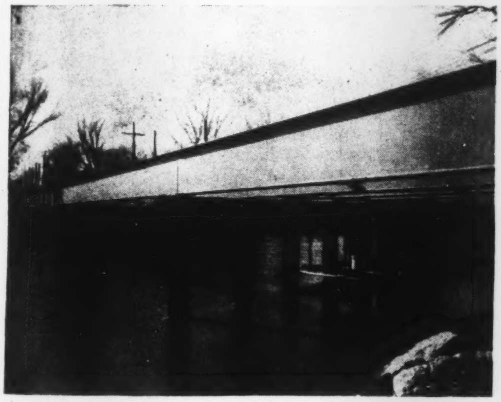
Although no federal funds were directly appropriated for this purpose, the act, as Dr. Parran explained, sets up a procedure, patterned after the program of federal aid for highway construction, which obligates the federal government to pay up to $75,000,000 as its share of approved hospital construction. Since the government pays one-third of the cost, this brings the potential combined total of federal, state and local funds to $225,000,000. Under this arrangement, states need not delay their hospital construction plans since they have the assurance that any construction project approved by the Surgeon General creates

STEEL for Highway Bridges *by BETHLEHEM*

What are your needs in highway bridge-building? Whether it's to be an all-steel bridge, or reinforced concrete, or concrete-and-steel, you can count on Bethlehem supplying all the steel that the designs require.

Structural steel . . . reinforcing bars . . . reinforcing trusses . . . steel "Battledeck Floor" . . . single and multiple-strand bridge cable and suspender wire ropes . . . steel-sheet piling and steel H-piling . . . these and many other steel products for bridge-building are supplied through the nearest Bethlehem district office, or through Bethlehem Steel Company, Bethlehem, Pa.





STEEL SHEET PILING

There are many applications for Bethlehem Steel Sheet Piling in the construction of highway bridges. Use it in temporary cofferdams, in the construction of bridge foundations, and in abutments and retaining walls. This piling is rolled in a wide range of sections, including straight, arch and deep-web, and Z-type sections.

STEEL H-PILING

Steel H-Piles have high column strength. They are used to best advantage in locations where they can be driven into hard ground material such as hard-pan or shale or to firm bearing on solid rock. In such cases extremely high bearing capacities can be developed.

Bethlehem Steel H-Piles are special wide-flange structural steel shapes having web and flanges of the same thickness. They are used in bridge foundations in the same manner as other types of bearing piles.

"BATTLEDECK FLOOR"

Steel "Battledeck Floor" is as light as timber but more durable than concrete. Where traffic is heavy or the bridge span of considerable length, the weight of the flooring will naturally be an important factor in the cost of the steel structure required to carry it. In such cases "Battledeck Floor" should be given full consideration.

"Battledeck Floor" has an advantage over other steel floors designed for lightness in that it is not composed of thin sections. It consists of standard rolled beams, placed lengthwise of the traffic, with a flat plate of substantial thickness welded over these beams. It is therefore assured of a life as long as that of the bridge which supports it.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

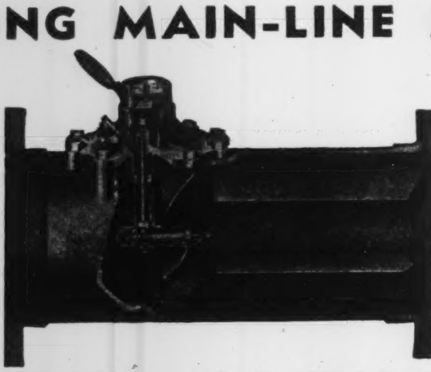
On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation

STEEL FOR HIGHWAYS

Road Joints Reinforcing Bars Bar Mats
Guard Rail Guard Rail Posts and Fittings
Wire Rope Hollow Drill Steel
Fabricated Structural Steel Sheet and H-Piling
Spikes Bolts and Nuts Tie-Rods
Timber Bridge Hardware

BETHLEHEM STEEL

SPARLING MAIN-LINE METERS



for SERVICE and SATISFACTION

FOR over 27 years the Sparling Meter has been giving thoroughly satisfactory service measuring flows—from pumps; into reservoirs, distribution lines and so on. Note the Direct Action—a propeller revolving with the flow is geared to a register reading in the desired unit! Each meter is a complete Totalizing unit, with Indicator, Recorder or Controls added as needed!

Bulletin 309
comes upon
your request

R. W. SPARLING
Manufacturer of WATER MEASURING EQUIPMENT

LOS ANGELES 54....Box 3277 Terminal Annex
CHICAGO 16.......3104 South Michigan Ave.
622 Broadway..........CINCINNATI 2
101 Park Avenue........NEW YORK 17
BOSTON 8..............6 Beacon Street

Construction Speeded with the New CLIPPER HOIST

FREE TRIAL on Your JOB

PORTABLE AND EASY TO OPERATE

You'll want the New Portable Clipper Hoist on your Job... Quickly set up ready for use. The Clipper Hoist is operated by only one man!

FEATURES AUTOMATIC UNLOADING

FASTER... Brick, tile, concrete and flue lining can be hoisted to greater heights, without fatigue.

FLEXIBLE... Practical for every job.

THE CLIPPER MANUFACTURING COMPANY
2800 WARWICK KANSAS CITY 8, MISSOURI
District Offices and Warehouses: Philadelphia • St. Louis • Austin, Tex

a contractual obligation on the part of the federal government to meet its one-third share of the cost.

This legislation implements the construction phase of the Hospital Survey and Construction Act passed by Congress last year, authorizing the appropriation of $3,000,000 for the survey and planning and $75,000,000 for construction annually for five years. Last year $2,250,000 was appropriated to assist the states in surveying existing hospital facilities. The $75,000,000 just appropriated for the fiscal year 1948 is the first money to be made available for construction. Funds may be used for health centers, laboratories, clinics and other medical facilities, as well as for hospitals.

◆

Contractor jailed for CPA violations

A contractor and two race track executives will serve three months in jail and pay fines of $7,500 each for CPA violations in the reconversion of Tanforan Race Track, San Bruno, Calif.

Earl W. Heple, contractor; Guy Standifer, president and William J. Levin, general manager of Tanforan Co., Ltd., will serve their terms in one of the Bay Area county jails. The contractor's project superintendent, A. W. Barnewitz, was sentenced to one month in jail and fined $1,000.

Federal Judge Dal M. Lemmon, San Francisco, last week denied a plea to vacate the jail sentences, originally ruled late in July. Fines for the four men have been paid, along with a $90,000 fine against the company.

The race track company was indicted early in April (*ENR*, Apr. 24, vol. p. 704) for conspiracy to violate CPA restrictions and use of some $200,000 worth of labor and materials diverted from veterans' housing in the rehabilitation of its facilities for the racing season. The track was taken over by the Navy early in the war.

Judge Lemmon, in passing sentence, termed track officials "so anxious to take advantage of the racing season they were willing to take a chance their violation of the law would be overlooked."

He quoted a regional federal housing expediter's report asserting that "great quantities" of material and labor needed for local housing had been used at Tanforan, enough to build 45 homes.

Counsel for the track had maintained that the company let the Navy abandon the track without returning it to its original condition with the understanding that it would be permitted to do its own reconversion work. It was pointed

Look underneath for the secret of profitable dump truck operation: Check the understructure first . . . look for plenty of sturdy crossmembers, scientifically placed to absorb all weight and strain. Then check the hoist itself: look for twin-arm construction, a big, powerful cylinder assembly, a precision-built pump and plenty of reserve power. Hercules gives you all these — and more!

To be doubly sure, watch a Hercules-BILT Hydraulic Hoist in action . . . packed with power, it raises the heaviest loads, smoothly, easily, quickly. That's why Hercules Dump Bodies and Hercules-BILT Hydraulic Hoists are the choice of dump truck operators who know how to make a profit on any job. And that's why your next dump truck unit should be Hercules.

Now in service on a New Jersey highway project, this Hercules Dump Body unit, equipped with Hercules-BILT Model 8X Hoist, hauls and dumps 7½ cubic yards of sand per load. Low center of gravity, wide body construction and twin-arm hoist are Hercules features that assure Herman Calvo, owner, of extra profits.

Here's where to look for Dump Truck PROFITS

THERE'S A HERCULES DISTRIBUTOR NEAR YOU

ALABAMA—BIRMINGHAM: Aronov Auto Supply Co., Inc., 420 S. 21st St. MOBILE: Betbeze, 610 St. Anthony. MONTGOMERY: Jake Aronov Auto Parts & Tire Co., Cor. Bell & Whitman Sts.

ARKANSAS—LITTLE ROCK: G. L. Turner, Inc., 320 E. Markham St. MEMPHIS, TENN.: Dealers Truckstell Sales, Inc., 365 S. Parkway, W.

CALIFORNIA—LOS ANGELES: General Truck Equipment Co., 1081 N. Vigness. OAKLAND: A. Pasteris Co., 2200 Wood St.

COLORADO—DENVER: The Colorado Builders' Supply Co., 324 S. Broadway.

FLORIDA—JACKSONVILLE: Clark Equipment Inc., 1839 Main St.

GEORGIA—ATLANTA: (COLLEGE PARK) Carley Trailer & Equipment Co.

IDAHO—TWIN FALLS: Twin Falls Equipment Co., 251 Main Ave., W.

ILLINOIS—CHICAGO: Voltz Bros., Inc., 2520 Indiana Ave. PEORIA: A. W. Moore, 2710 S. Adams St. BETTENDORF, IOWA: Standard Wholesale Co., 1525 State St. ST. LOUIS, MO.: Truck Equipment Co., 511 N. Channing Ave. EVANSVILLE, IND.: Hercules Body Co., Inc.

INDIANA—EVANSVILLE: Hercules Body Co., Inc. FORT WAYNE: Peerless Manufacturing Co., 4227 Bluffton Rd. INDIANAPOLIS: John Guedelhoefer Wagon Co., Inc., Kentucky Ave., at Georgia Ave. LOUISVILLE, KY.: J. Edinger & Son, 1010 Story Ave. CINCINNATI, O.: The Bode-Finn Co., 2650 Spring Grove Ave.

IOWA—BETTENDORF: Standard Wholesale Co., 1525 State St. CEDAR RAPIDS: E. Cohn & Sons, Inc. SIOUX CITY: Barton-Stephens & Co., 1909 E. Fourth St.

KENTUCKY—LOUISVILLE: J. Edinger & Son, 1010 Story Ave. HUNTINGTON, W. VA.: Huntington Truck Equipment Co., 919 Sixth Ave. EVANSVILLE, IND.: Hercules Body Company, Inc. CINCINNATI, O.: The Bode-Finn Co., 2650 Spring Grove Ave.

LOUISIANA—NEW ORLEANS: Magnolia Equipment & Security Corp., 900 Jefferson Hwy. SHREVEPORT: Dealers Truck Equipment Co., Inc., 1561 Texas Ave. (MEMPHIS, TENN) Dealers Truckstell Sales, Inc., 355 S. Parkway, W.

MARYLAND—BALTIMORE: United Truck Equipment Co., 1242 S. Paca St.

MASSACHUSETTS—BOSTON: (CAMBRIDGE) Hercules-Campbell Body Co., 130 Brookline St.

MICHIGAN—DETROIT: Waggy-Hoffman Equipment Co., 14089 Schaefer Hwy. (CHICAGO, ILL.) Stahmer Supply Co., 135 S. LaSalle St.

MINNESOTA—ST PAUL: General Truck & Equipment Co., 2535 University Ave.

MISSISSIPPI—MEMPHIS, TENN.: Dealers Truckstell Sales, Inc., 365 S. Parkway, W. MOBILE, ALA.: Betbeze, 610 St. Anthony.

MISSOURI—KANSAS CITY: American Body & Equipment Co., 1411 Charlotte St. ST. LOUIS: Truck Equipment Co., 511 N. Channing Ave.

MONTANA—BILLINGS: Western Construction Equip. Co., 505 N. 24th St. MISSOULA: Western Construction Equip. Co., 218 W. Pine St.

NEBRASKA—LINCOLN: Highway Equip. & Supply Co., 21st & N Sts. SCOTTSBLUFF: Colorado Builders' Supply Co., 602 W. 27th St.

NEW MEXICO—ALBUQUERQUE: The Harry Cornelius Co., 1510 N. Second St.

NEW YORK—BUFFALO: Truckstell-Wilcox, Inc., 224 W. Utica St. TARRYTOWN: Hercules-Campbell Body Co., Inc. WATERLOO: Hercules-Campbell Body Co.

NORTH CAROLINA—RALEIGH: J. B. Hunt & Sons, 323-25 W. Martin St. SPRUCE PINE: Mitchell Distributing Co.

NORTH DAKOTA—ST. PAUL, MINN.: General Truck & Equip. Co., 2535 University Ave.

OHIO—CANTON: Ewing Brothers, 929-41 Cleveland Ave., N. W. CINCINNATI: The Bode-Finn Company, 2650 Spring Grove Ave. CLEVELAND: The Trailmobile Company, 1808 E. 22nd St. COLUMBUS: Hercules Body Sales Co., 580 Hamlet St. UHRICHSVILLE: Wells Body Co., 112-20 Lake St. YOUNGSTOWN: O'Dea Truck Body Sales, 2035 Ohio Ave. HUNTINGTON, W. VA.: Huntington Truck Equip. Co., 919 Sixth Ave. DETROIT, MICH.: Waggy-Hoffman Equipment Co., 14089 Schaefer Highway.

OKLAHOMA—LAWTON: Tompkins Auto Salvage Co., 917 S. Second St. OKLAHOMA CITY: The Diesel Power Co., 1801 N. E. Ninth St. TULSA: The Diesel Power Co., 4th & Elgin Sts.

OREGON—PORTLAND: Newell Truck Equipment Co., 316 N. Russell St.

PENNSYLVANIA—ALTOONA: Brumbaugh Body Co., 100 Plank Road. ERIE: The Trailmobile Co., 1223 Walnut St. LEBANON: M. A. Brightbill Body Works, E. Cumberland St. at 7th Ave. PHILADELPHIA: Eastern Body Co., 31st & Fletcher Sts. PITTSBURGH: Hercules-Pittsburgh Body Co., 1717 Mary St., S. S.

SOUTH CAROLINA—COLUMBIA: South Carolina Equipment Co., P. O. Box 295.

SOUTH DAKOTA—ST. PAUL, MINN.: General Truck & Equip. Co., 2535 University Ave.

TENNESSEE—CHATTANOOGA: Ted Nelson Service & CHR Alignment Co., 416-18 Market St. KNOXVILLE: Knoxville Structural Steel Co., P. O. Box 1512. MEMPHIS: Dealers Truckstell Sales, Inc., 365 S. Parkway, W. NASHVILLE: Halliburton & Lane Co., 5th Ave. & McGavock.

TEXAS—DALLAS: Truck Equipment Co., 2409-11 Commerce. FORT WORTH: Truck Equip. Co. HOUSTON: McArthur Welding & Press Co., 5525 Clinton Dr. SAN ANTONIO: Patten Machinery Co., 1318 N. Alamo St. CORPUS CHRISTI: Truck Equip. Co., 1501 Port Ave.

UTAH—SALT LAKE CITY: Hercules Body Sales Co., 2205 Highland Drive.

VIRGINIA—NORFOLK: A. S. Drumwright & Co., 1921 Brambleton Ave. RICHMOND: Crenshaw Equipment Co., Inc., 304 E. Main St.

WASHINGTON—SEATTLE: Allied Trailer & Equip. Co., 1331 Third Ave.

WEST VIRGINIA—BLUEFIELD: Truck Equip. Engineering Co., P. O. Box 387. CHARLESTON: West Virginia Tractor & Equip Co., P. O. Box 473. CLARKSBURG: West Virginia Tractor & Equip. Co., 100 Wood St. HUNTINGTON: Huntington Truck Equip. Co., 919 Sixth Ave.

HERCULES DUMP BODIES *and* HYDRAULIC HOISTS

HERCULES STEEL PRODUCTS CORPORATION . . . GALION, OHIO

"I'M A Member OF THE UNDERGROUND"

24 HOURS A DAY

"I WORK at night — days too, but it's all the same day or night, when you're underground. I'd lose track of the time if my operators weren't changed every eight hours or so."

15 LOCOMOTIVES

"RIGHT now 15 of us are busily engaged 24 hours a day getting the much needed coal out of the Eregli bituminous mines of Turkey. I pull quite a load though my weight is only 7 tons, for I can walk away with 44 tons of coal up a 1% grade at 3.7 MPH, which isn't bad. Of course, I can travel faster because I'm geared to a maximum speed of 15 MPH but even when traveling light I generally loaf along at about 6 MPH. You see speed is not as important as pulling power down here; the job is more for a dray horse than a race horse."

SAFE ENGINE EXHAUST

"ANOTHER good thing about me is that I'm safe — no sir, I don't start any of those mine explosions, even if my operator feeds me too much fuel too fast and I am compelled to back fire. Here's the secret — my engine exhaust is routed through a water muffler which eliminates the possibility of sparks or flame and the accompanying danger of explosion."

"I'M especially designed for mine and tunnel work but I'll do a good job any place underground where the percentage of methane (explosive gas) content of the air is not considered dangerous. And I'm very reasonable in the first cost and unbelievably economical to operate and maintain."

"I AM A 7 TON, WHITCOMB DIESEL MECHANICAL MINE LOCOMOTIVE, DESIGNED AND BUILT AT ROCHELLE, ILLINOIS, BY THE WHITCOMB LOCOMOTIVE COMPANY."

out that the agreement saved the government thousands of dollars.

Counsel also contended that of all the supplies listed in the charges only the plaster could have been used in home construction.

◆

Seek design suggestions for Delaware River span

With the borings for subsurface soil tests on the new $40,000,000 Delaware River Bridge progressing steadily, the crossings division of the Delaware State Highway Department has asked for public opinion on the type of main towers for the span.

Lieut.Gen. Eugene Reybold, engineer of the division, disclosed that this unique action was taken because the towers, probably the most decorative part of the structure, would be under inspection for many years and that the design selected should be a pleasing one.

Two distinct types of design have been under consideration for the main towers, one with a cross strut of the "vertical parabolic" type and one of a simple "curved bottom" type.

◆

N. Y. harbor pollution studied by tri-state group

A sanitary group from New Jersey, New York and Connecticut recently studied causes of water pollution in New York harbor and adjacent waters. The inspection tour of outfall sewer openings was made aboard the Sea Echo, U. S. Army Engineers cutter, and was arranged by the Interstate Sanitation Commission.

Seth G. Hess, director and chief engineer of the commission, said the inspection was preliminary to the issuance of orders to municipalities to take sewage disposal measures wherever trouble was found.

The Interstate Sanitation Commission was created ten years ago through legislative action by New York, New Jersey and Connecticut.

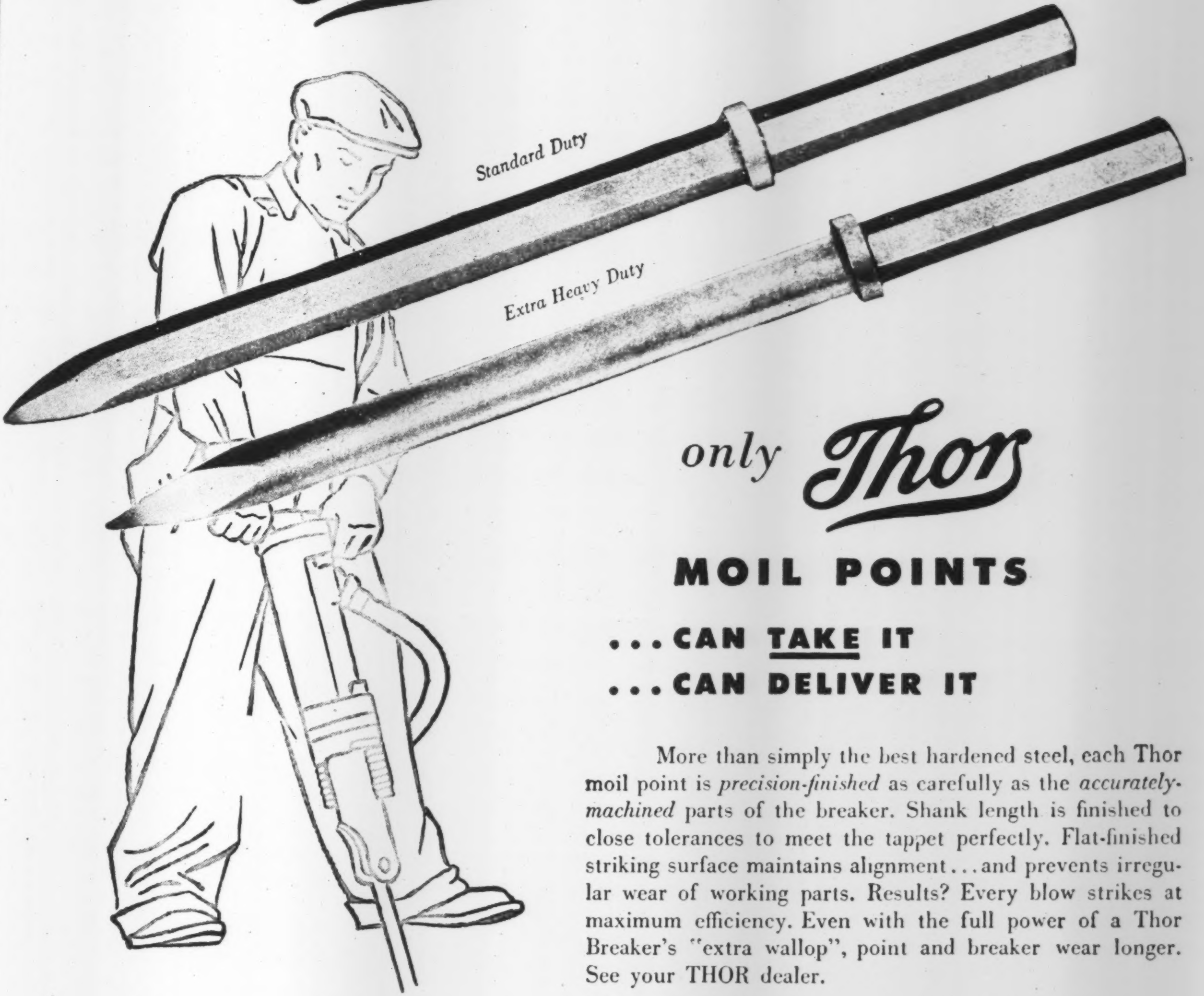
◆

Sound-proof plant completed at Hollywood

Offices and sound stages have been completed at a cost of $2,500,000 for Nassour Studios, Inc., Hollywood, Calif. Edward Nassour, president, reported that the building project is practically half done. An additional $3,000,000 has been allocated for two large sound stages as the next step in the development of Nassour Studios. The buildings already completed constitute the first modern completely soundproof motion-picture plant in the world.

TWO GOOD POINTS

about Thor "Extra Wallop"



only Thor

MOIL POINTS

...CAN TAKE IT

...CAN DELIVER IT

More than simply the best hardened steel, each Thor moil point is *precision-finished* as carefully as the *accurately-machined* parts of the breaker. Shank length is finished to close tolerances to meet the tappet perfectly. Flat-finished striking surface maintains alignment... and prevents irregular wear of working parts. Results? Every blow strikes at maximum efficiency. Even with the full power of a Thor Breaker's "extra wallop", point and breaker wear longer. See your THOR dealer.

INDEPENDENT PNEUMATIC TOOL COMPANY
600 West Jackson Boulevard, Chicago 6, Illinois

Birmingham Boston Buffalo Cincinnati Cleveland Denver Detroit Houston
Los Angeles Milwaukee New York Philadelphia Pittsburgh St. Louis
St. Paul Salt Lake City San Francisco Toronto, Canada London, England

...Thor... PORTABLE POWER TOOLS

PNEUMATIC TOOLS • UNIVERSAL AND HIGH FREQUENCY ELECTRIC TOOLS • MINING AND CONTRACTORS TOOLS

NOW
YOU CAN
SPECIFY A

BUMPLESS
HIGHWAY
MAINTAINS PERFECT BOND DURING SUB-ZERO TEMPERATURES

THE ORIGINAL
Para-Plastic
REG. U. S. PAT. OFF.
HOT-POURED RUBBER SEAL

PARA-PLASTIC remains flexible all year 'round. Its elasticity is permanent in any temperature without breaking its bond with concrete.

PARA-PLASTIC maintains a positive and permanent seal in any temperature against the infiltration of water.

•

"STICK"
WITH THE
ORIGINAL
ALL YEAR 'ROUND!

•

PARA-PLASTIC is the ORIGINAL hot-poured top seal for concrete expansion joints.

PARA-PLASTIC pours smoothly and uniformly at a low pouring point.

Millions of pounds of PARA-PLASTIC have been used by contractors throughout the country.

Write for further technical information

PARA-PLASTIC is specified by State Highway Departments and Army and Navy Engineers.

SERVICISED PRODUCTS CORP.
6051 West 65th Street Chicago 38 Ill

Tacoma, Wash., to get more power

On account of an unprecedented load growth on the electric distribution system of Tacoma City Light at Tacoma, Wash., recent estimates by the light division engineers indicate a need for an additional 100,000 kw. of generating capacity much sooner than had been predicted. The current estimates based on a 7½ annual load growth which dictate Tacoma's need for the additional 100,000 kw. within six to seven years are said to be consistent with estimates of other Northwest electric utilities. In January, 1947, a load of 178,000 kw. was carried by Tacoma City Light on hydro plants which had a rated capacity of 179,000 kw. Since that time the final unit rated at 25,000 kw. has been installed in the Alder plant.

Anticipating the greater need, Tacoma, situated in a region faced with a power shortage and possible curtailment in the plans for development of federal power on the Columbia River, has directed effort toward the possible development of two major cities on the Cowlitz River within 25 miles of the Alder Plant or 53 miles from Tacoma. Early in 1946 the city acquired the assignment of a state permit which authorizes the construction of a dam near Mayfield, Wash. More recently a temporary permit was received from the state of Washington for the investigation of another site near Mossy Rock, approximately 7 miles upstream from Mayfield, at which, in accordance with a previous filing, Tacoma had made application to divert 3,500 cfs.

The nature of the stream and conditions at the sites are such that a development similar to the present Cushman and Nisqually projects is possible according to J. Frank Ward, superintendent of the light division. In this respect the upper plant with a prospective reservoir capacity of approximately 1,000,000 ac. ft. will provide storage and regulation whereas pondage only is provided at the lower site. The upper and lower dams will approximate 300 ft. and 150 ft. in height respectively. A total installed capacity of approximately 150,000 kw. with annual generation in a normal water year amounting to approximately 1,088,000,000 kwh. is estimated.

Investigation of the sites is in progress. If development is feasible and conditions warrant it is proposed that the city proceed eventually with construction at both sites. In view of the permit for construction at Mayfield the city proposes to proceed at the lower site without delay, pending feasibility of the site and the warranty of power requirements.

DUFFIN IRON COMPANY
Established 1878

FABRICATORS of
STRUCTURAL STEEL

Buildings, Bridges and All Type of Steel Structures

•

General Office and Works:
4837 So. Kedzie Ave.
Chicago 32, Ill.
Phone Lafayette 0732

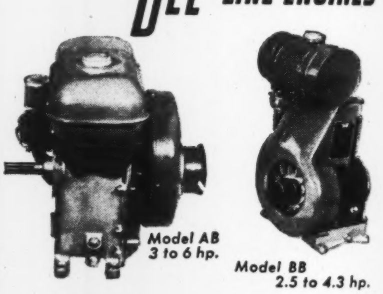
•

Contracting Office:
Suite 1600 - 37 W. Van Buren St.
Chicago 5, Ill.
Phone: Harrison 8813

•

For Service and Dependability Have It Fabricated by Duffin!

BEE-LINE ENGINES



In Volume Production
Prompt Delivery

These 4-cycle, air-cooled gasoline engines are thoroughly service-proved in many applications. Light weight, compact design, and wide power range mean ready adaptability to many types of equipment and powering problems. Backed by 28 years of engine building experience, including manufacture of the famous Kinner aircraft engines.

Gladden Products
CORP.
635 W. Colorado Blvd., Glendale 4, Calif.